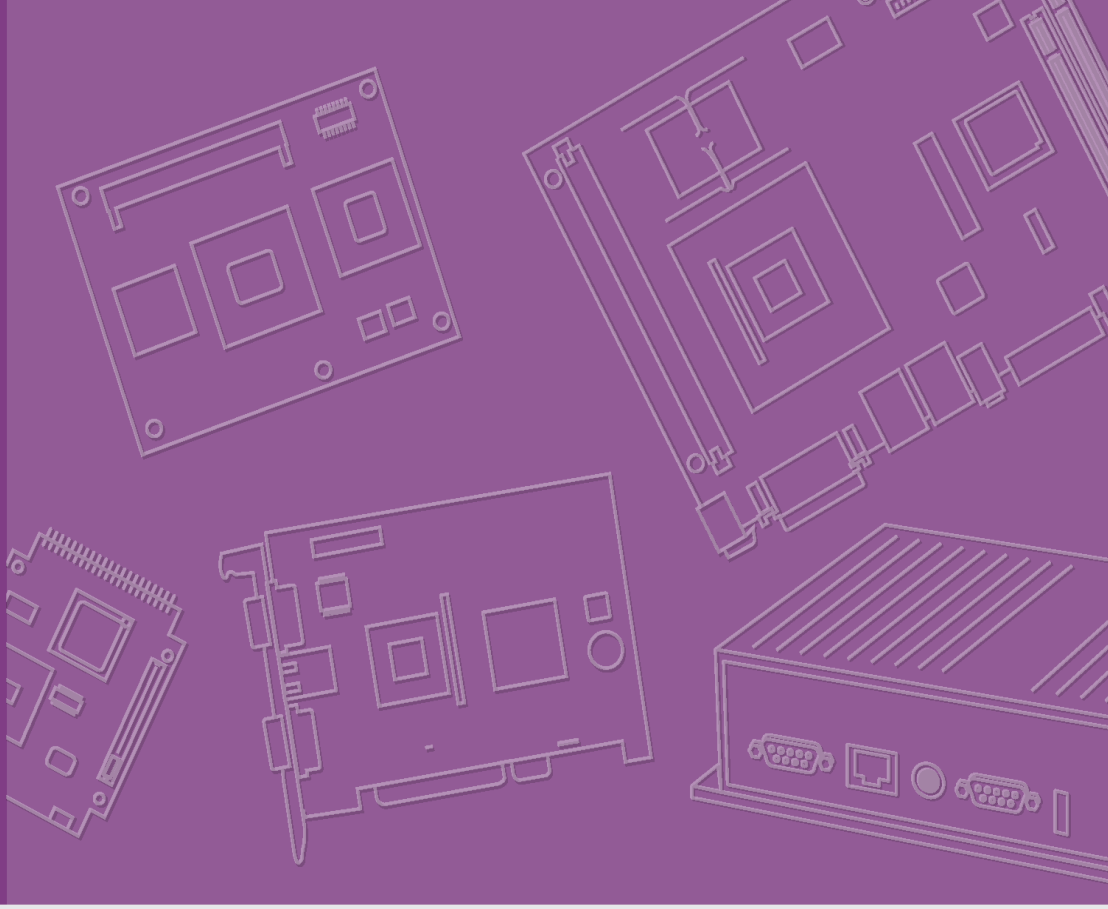

User Manual

PCM-9388

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Warranty Period

The manufacturer aims to meet the customer's expectations for post-sales service and support; therefore, in addition to offering 2 years global warranty for our standard products, a global extended warranty service is also provided for customers upon request. Our customers are entitled to complete and prompt repair service beyond the standard 2 years of warranty.

As a standard, most products manufactured by us are covered by a 2 year global warranty from the date of shipment. Products covered by extended warranty and cross-region repair services against defects in design, materials, and workmanship, are also covered from the date of shipment. All key parts assembled into a computer system products such as LCD, touchscreen, power supply, and peripherals, etc., will be covered by the standard 1 year warranty.

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DOA Cross-Shipment excludes any customized and/or build-to-order products. The Cross-Shipment agreement signed by customers is required for initiating/releasing cross shipment with technician confirmation and verification. The only conditions for Cross-Shipment are: a) the return must not be damaged, altered or marked, b) all parts and accessories must be included as originally shipped; and c) proof of purchase must be included. Any returns that do not meet mentioned requirements above, or any wrong user settings/configurations will be denied, or subject to additional handling/service charges as determined by the Repair Service Department.

For those products which are not DOA, or damaged, the return fee to an authorized repair facility will be at the customers' expense. The shipping fee for reconstructive products from the warehouse back to customers' sites will be at our expense.

Exclusions from Warranty

The product is excluded from warranty if:

- The product has been found to be defective after expiry of the warranty period.
- Warranty has been voided by removal or alteration of product or part identification labels.
- The product has been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable physical or operating environment; improperly maintained by the customer; or failure caused which manufacturing is not responsible whether by accident or other cause. Such conditions will be determined by technicians at time of repair and their discretion.
- The product is damaged beyond repair due to a natural disaster such as a lighting strike, flood, earthquake, fire, etc.
- Products without warranty have been updated/upgraded or tested by customers.

Declaration of Conformity

FCC

This device complies with the requirements in part 15 of the FCC rules: Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense. The user is advised that any equipment changes or modifications not expressly approved by the party responsible for compliance would void the compliance to FCC regulations and therefore, the user's authority to operate the

equipment.

Caution! *There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*

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For technical support and service, please visit our support website at:

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Additional Information and Assistance

1. Visit the reseller web site at http://www.emacinc.com/ where you can find the latest product information.
2. Contact your distributor, sales representative, or customer service center for technical support if you need additional assistance. Please have the following information ready before you call or email:

- Product name and serial number
- Description of your peripheral attachments
- Description of your software (operating system, version, application software, updates installed, etc.)
- A complete description of the problem
- The exact wording of any error messages

Packing List

Before installation, please ensure the following items have been shipped:

Item Part Number

1 PCM-9388 SBC
1 Startup manual (optional on CD)
1 Utility CD (Optional)
1 Printer Port cable
1 mini jumper pack
1 IDE cable
1 Audio cable
1 Dual Port USB cable
1 PS2 KB/MS cable
1 RS232/422/485 cable

Ordering Information

Model Number Description

PCM-9388F-M	Celeron® M 600 (512 K) SBC,VGA,LCD,Audio,ISA,ROHS
PCM-9388F-S	Celeron® M 1G (0 K) SBC,VGA,LCD,Audio,ISA,ROHS

Optional Accessories

Model Number Description

1700001531	FLAT CABLE 34P-2.54 mm/26P-2. 0mm 30 cm(LPT to FDD)
1703070101	Wire ATX20P/7P 10 cm(ATX power cable)

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Chapter 1

General Introduction

This chapter gives background information on the PCM-9388

Sections include:

- Introduction
- Specifications

1.1 Introduction

The PCM-9388 is a 3.5" SBC (Single Board Computer) with Intel Celeron® M on board CPU.

The PCM-9388, in conjunction with Intel 852GM and ICH4 chipsets, supports processors clocked up to 1.0 GHz, two USB 2.0 compatible ports, one Ethernet connector up to 10/100 Mbps, 2-channel 18-bit LVDS (Optional support 2 x 24-bit LVDS) and one 18-bit TTL LCD which can support dual independent display (LVDS + VGA/TTL + VGA), can accommodate up to 1 GB of DDR SODIMM RAM memory (supports DDR 266 MHz), and one IDE (supports up to two devices), and two COM ports.

The PCM-9388 also has the ability for expansion with one PC/104 connector.

1.2 Product Specifications

1.2.1 General

- **CPU:** Embedded Intel® Celeron M 600 MHz/1 GHz
- **2nd Cache Memory:** Depends on CPU from 0 KB to 512 KB
- **System Chipset:** Intel® 852 GM GMCH/ICH4 Chipset
- **BIOS AWARD:** 512 kbit Flash BIOS
- **System Memory:** 1 x 200-pin SODIMM socket, supports Double Data Rate (DDR) up to 1 GB, accepts up to 266 MHz DRAM
- **Watchdog Timer:** 255-level interval timer, setup by software, Super I/O integrated in Winbond Controller
- **Expansion Interface:** Supports PC/104
- **Battery:** Lithium 3 V/210 mA

1.2.2 I/O

- **I/O Interface:** 1 x EIDE (UDMA 33), 1 x CF, 1 x K/B, 1 x Mouse, 1 x RS-232, 1 x RS-232/422/485, 1 x LPT, 1 x FDD (shared with LPT)
- **USB:** 2 x USB 2.0 compliant ports
- **Audio:** AC97 Audio codec ALC203, supports 2.1 channel; supports Line-in, Line-out, Microphone
- **IrDA:** 115 kbps, SIR, IrDA 1.0 compliant
- **GPIO:** 8-bit general purpose input/output

1.2.3 Ethernet

- **Chipset:** 1 x Realtek RTL8100CL
- **Speed:** 10/100 Mbps
- **Interface:** 1 x RJ45
- **Standard:** IEEE 802.3u 100Base-T

1.2.4 Display

- **Chipset:** Intel 852GM chip integrated. (Intel Extreme Graphics 2 technology)
- **Resolution:**
  - CRT Display mode: pixel resolution up to 1600 x 1200 @ 85 Hz; 1920 x 1440 @ 60 Hz.
  - LCD Display mode: Dual channel LVDS panel supports up to UXGA panel resolution with frequency range from 25 MHz to 112 MHz
- **LCD Interface:** 2 Channel LVDS (36-bit), optional for 48-bit and 1x 18-bit TTL LCD
- **LVDS:** Hirose connector supports up to 2 channel (1 x 36-bit) LVDS LCD Panel
- **TTL:** Hirose connector supports up to 1 x TTL LCD Panel
- **Dual Ind. Display:** CRT + LVDS; CRT + TTL

1.3 Chipset

1.3.1 Functional Specifications

1.3.1.1 Processor

Processor	■ Intel Celeron support ■ 400 MHz FSB Support ■ 32-bit host bus addressing

1.3.1.2 Chipset (852)

Memory	■ 852GM GMCH Supports ■ 1 GB maximum memory ■ Two 64-bit wide DDR SDRAM data channel ■ Support DDR 200, DDR266 MHz ■ 128-Mb, 256-Mb, 512-Mb and 1-GB DDR technology Socket: SODIMM Socket: 1. 200-pin SODIMM socket type *1

Graphic and Video Controllers	■ 852GM GMCH Support ■ Up to 64-MB of Dynamic Video Memory Allocation ■ Analog Display Support 350-MHz integrated 24-bit RAMDAC ■ Dual Channel LVDS interface supports 36 bits ■ CRT monitor resolutions supported: ■ Up to 1600 x 1200 at 85 Hz, and up to 1920 x 1440 at 60 Hz LVDS panel resolution supported: Up to 1600 x 1200 at 85Hz ■ Dual independent display options with digital display Analog CRT Connector: D-Sub 15-pin 5mm (Black) LVDS connector: Hirose DF13 type 40-pin TTL connector: Hirose DF13 type 40-pin

1.3.1.3 Chipset (ICH4)

PCI Bus Interface	Supports PCI Rev 2.3 Specification at 33 MHz 133 MB/sec maximum throughput
IDE Interface	Supports up to 2 IDE drives and one CF Ultra ATA 33, BMIDE and PIO mode
AC-Link Interface	Support for three AC97 2.3 codecs Support for 2.1 channels (PCM In/Out, Mic 1 input)
USB Interface	USB1.1, 2.0 compliant Including UHCI, EHCI Host controller Supports maximum 2 ports
SMbus	Supports SMBus 2.0 Specification Host interface allows CPU to communicate via SMBus

1.3.1.4 Others (Chipset)

PCI to ISA	ITE8888G support PCI specification V.2.1 compliant Optional CLKRUN# interface support Supports full ISA compatible functions Supports ISA at 1/4 of PCI frequency

1.3.2 Mechanical Specifications

1.3.2.1 Dimensions (mm)

147 mm (L) * 102 mm (W)

1.3.2.2 Height on Top (mm)

17.0 mm (with Heatsink)

1.3.2.3 Height on Bottom (mm)

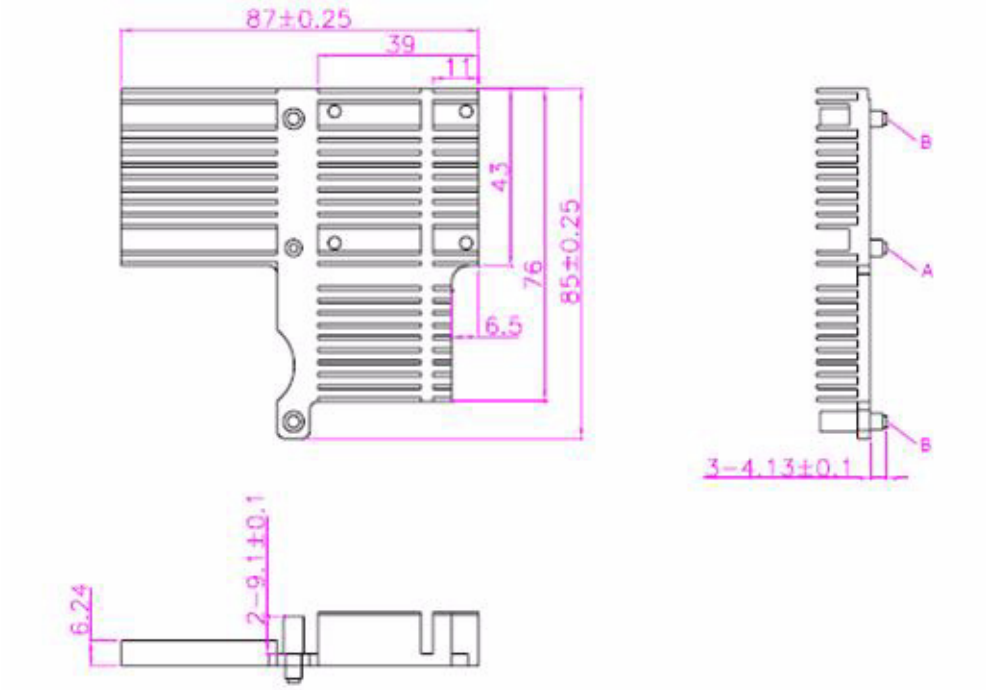
9 mm (CF socket)

1.3.2.4 Heatsink Dimensions (mm)

87mm (L) * 85 mm (W) * 13.04 mm (W) (Heatsink)

1.3.2.5 Weight (g) with Heatsink

95 g



1.3.3 Electrical Specifications

1.3.3.1 Power Supply Voltage

- Voltage requirement with ATX Power:
  +5 VDC +/- 5%
  +5 VDC Standby +/- 5%
  +12 VDC +/- 5% (For LVDS inverter power, PC/104)
- Voltage requirement with AT Power:
  +5V DC +/- 5%
  +12V DC +/- 5% (For LVDS inverter power, PC/104)

1.3.3.2 Power Supply Current

CPU Type	Status	256MB/533/ADATA	
		+5 V	+12 V
Celeron M 600MHz FSB=400 L2=512 K	DOS Idle	2.44 A	0.05 A
	Win Idle	1.56 A	0.16 A
	Win HCT11.2	2.11 A	0.17 A

1.3.3.3 RTC Battery

Typical Voltage: 3.0 V

Normal discharge capacity: 210 mAh

1.3.4 Environmental Specifications

1.3.4.1 Operating Temperature

The Intel® Celeron® M processor is specified for proper operation when the junction temperature is within the specified range of 0° C to 100° C.

The Intel® 852GM chipset temperature runs at a maximum of 100° C. The Intel® ICH4 I/O Controller case temperature runs at a maximum of 85° C.

The processor protects itself from catastrophic overheating by use of an internal thermal sensor at a temperature level of approximately 100° C.

Operating temperature: 0 ~ 60° C (32 ~ 140° F)

1.3.4.2 Operating Humidity

Operating Humidity: 0% ~ 90% Relative Humidity, non-condensing

1.3.4.3 Storage Temperature

Standard products: 0 ~ 60° C

Storage temperature: -20 ~ 70° C

1.3.4.4 Storage Relative Humidity

Standard products (0 ~ 60° C)

Relative humidity: 95% @ 60° C

Chapter 2

H/W Installation

This chapter explains the setup procedures of the PCM-9388 hardware, including mechanical drawings, and instructions on setting jumpers and connecting peripherals, switches, and indicators. Be sure to read all safety precautions before you begin the installation procedure.

2.1 Jumpers

2.1.1 Jumper List

J1	AT/ATX selector
J2	Audio power selector
J3/J4/J5	COM2 Setting
J6	LCD power selector

2.1.2 Jumper Settings

J1	**AT/ATX selector**
Description	**PIN HEADER 2*1P 180D (M)SQUARE 2.0 mm DIP W/O Pb**
Setting	**Function**
(1-2)	AT Power
none	ATX Power

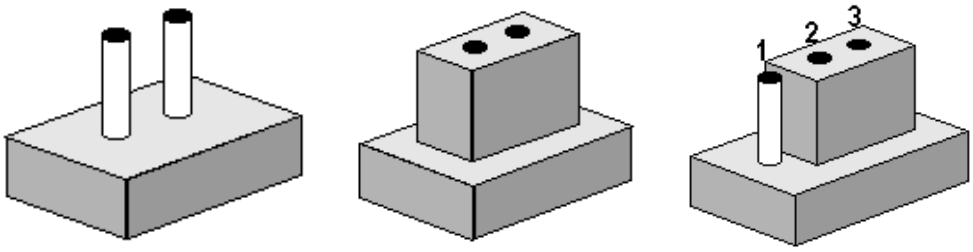
J2	**Audio power selector**
Description	**PIN HEADER 3*1P 180D (M) SQUARE 2.0 mm**
Setting	**Function**
1-2	Audio Power form 12 V-input & 5 V-output LDO
2-3	Audio Power from 5 V

J3/J4/J5	**COM2 Setting**
Description	**PIN HEADER 2*1P 180D (M) SQUARE 2. 0mm**
Setting	**Function**
J3 (1-2)	RS-422
J4 (1-2)	RS-232
J5 (1-2)	RS-485

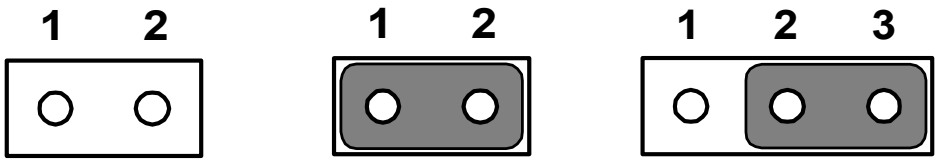
J6	**LCD power selector**
Description	**PIN HEADER 3*1P 180D(M) 2.0 mm DIP SQUARE W/O Pb**
Setting	**Function**
J6 (1-2)	+5 V
J6 (2-3)	+.3.3 V

2.1.3 Jumper Description

Cards can be configured by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To close a jumper, you connect the pins with the clip. To open a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2, or 2 and 3.



The jumper settings are schematically depicted in this manual as follows:



A pair of needle-nose pliers may be helpful when working with jumpers. If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

Setting	Function
1-2	+5 V
2-3	+3.3 V

Warning! *To avoid damaging the computer, always turn off the power supply before setting jumpers. Clear CMOS. Before turning on the power supply, set the jumper back to 3.0 V Battery On.*

2.2 Connectors

2.2.1 Connector List

CN1	AT POWER Connector
CN2	ATX POWER Standby Connector
CN3	SMBus
CN4	FAN Connector (SPEED Detect)
CN5	ATX Power Button Connector
CN6	GPIO
CN7	AUDIO Connector
CN8	IDE Connector
CN9	CompactFlash
CN10	HDD & PWR LED
CN11	VGA
CN12	COM1
CN13	LPT Connector
CN14	IR Connector
CN15	COM2 RS-232/RS-422/RS-485 Connector
CN16	USB Connector
CN17	PS2 (KB & MS)
CN19	LAN Connector
CN20	PC/104 SOLDER CONNECTOR
CN21	Negative POWER Input
CN22	LVDS LCD 40-Pin HIROSE
CN23	Invert Power Connector
CN24	TTL LCD 40-Pin HIROSE

2.2.2 Connector Settings

2.2.2.1 Power Connectors (CN1, CN2, CN4, CN5)

Main power connector, +5 V, +12 V or 5V only

PCM-9388 supports ATX and AT modes.

One 4-Pin connector (CN1) supports 5 V/12 V AT power supply.

Use ATX power cable (PN: 1703200201 ATX power control cable) connect CN2; it provides 5 VSB for ATX power.

One 2-pin connector (CN5) for power button connector.

Fan power supply connector (CN4)

Provides +5 V power supply to CPU cooling fan.

2.2.2.2 SMBus Connector

One 4 x 1 pin wafer box (CN3) supports SMBus interface.

2.2.2.3 GPIO (General Purpose Input Output) (CN6)

The board supports 8-bit GPIO through GPIO connector.

The digital inputs and outputs can be programmed as input data or output to devices, with input or output defined. (CN6).

2.2.2.4 Audio Interface (CN7)

Audio Port Connectors

One 5 x 2-pin box header for Audio connector. These audio connectors are used for audio devices.

2.2.2.5 IDE, CDROM Hard Drive Connector (CN8)

The board provides 1 IDE channel with which you can attach up to two Enhanced Integrated Device Electronics hard disk drives or CDROM to the board.s internal controller. Its IDE controller uses a PCI interface.

This advanced IDE controller supports faster data transfer, PIO mode 4, Multi-word DMA mode 2 and an UltraDMA-33 interface.

Connecting the hard drive

Connecting drives is done in a daisy-chain fashion. This package includes one 44-PIN IDE cable that can connect to 1.8" and 2.5" drives.

1. Connect one end of the cable to Hard Drive connector. Make sure that the red (or blue) wire corresponds to pin 1 on the connector, which is labeled on the board (on the right side).
2. Plug the other end of the cable into the Enhanced IDE hard drive, with pin 1 on the cable corresponding to pin 1 on the hard drive.

(See your hard drive's documentation for the location of the connector).

If desired, connect a second drive as described above.

Unlike floppy drives, IDE hard drives can connect to either end of the cable. If you install two drives, you will need to set one as the master and one as the slave by using jumpers on the drives. If you install only one drive, set it as the master.

2.2.2.6 Solid State Disk

The board provides a CompactFlash. card type I socket.

CompactFlash (CN9)

The CompactFlash card shares a Primary IDE channel which can be enabled/disabled via the BIOS settings.

2.2.2.7 Power & HDD LED Connector (CN10)

Next, you may want to install external switches to monitor and control the board. These features are optional: install them only if you need them.

The Power & HDD LED connector is 4-pin Wafer box connector. It provides connections for a power and hard disk access indicator.

Power & HDD LED Connector (CN10)

The HDD LED indicator for hard disk access is an active low signal (24 mA sink rate).

Power Reset button (S1)

Momentarily pressing the reset button will activate a reset. The switch should be rated for 10 mA, 5 V.

2.2.2.8 VGA/LCD/LVDS Interface Connections

CRT display connector (CN11)

The CRT display connector is DB15 connector used for conventional CRT displays.

LVDS LCD panel connector (CN22)

The board supports 2 channel 18-bit LVDS LCD panel display.

Users can connect a 48-bit LVDS LCD to it (optional)

TTL LCD panel connector (CN24)

The board supports 18-bit TTL LCD panel display.

LCD inverter Power connector (CN23)

The LCD inverter is connected to CN6 via a 5-pin connector to provide +5 V/+12 V power.

2.2.2.9 COM Port Connector (CN12, CN15, J3/J4/J5)

The PCM-9388 provides 2 serial ports (COM1 and COM2).

One 7*2P PIN HEADER (CN15) for COM2 output; and one DB-9 connector for COM1(CN12)

COM RS-232/422/485 settings (J3)

COM2 can be configured to operate in RS-232, RS-422, or RS-485 mode.

This is done via J3.

J3/J4/J5	COM2 Setting
Setting	Function
J3 (1-2)	RS-422
J4 (1-2)	RS-232
J5 (1-2)	RS-485

It provides connections for serial devices (ex: a mouse, etc.) or a communication network. You can find the pin assignments for the COM port connector in Appendix A.

2.2.2.10 Parallel Port Connector (CN13)

Normally, the parallel port is used to connect the card to a printer. The board includes a multi-mode (ECP/EPP/SPP) parallel port accessed via CN13

The parallel port is designated as LPT1, and can be disabled in the system BIOS setup.

The parallel port interrupt channel is designated to be IRQ7.

You can select ECP/EPP DMA channel via BIOS setup.

2.2.2.11 IR Connector

One 5 x 1-pin wafer box(CN14) supports IrDA; 115kbps, IrDA1.1 compliant.

2.2.2.12 USB Connectors (CN16)

The board provides up to two USB (Universal Serial Bus) ports. This gives complete plug and play capability. The USB interfaces comply with USB specification Rev. 2.0 which supports 480 Mbps transfer rate, and are fuse protected.

5 x 2 pin 180D (M) connectors for internal 2 x USB connectors at CN16.You will need an adapter cable if you use a standard USB connector. The adapter cable has a 5 x 2-pin connector with foolproof protection for incorrect plug-in on one end and a USB connector on the other.

2.2.2.13 Keyboard and PS/2 Mouse Connector (CN17)

The board provides a keyboard connector that supports both a keyboard and a PS/2 style mouse. In most cases, especially in embedded applications, a keyboard is not used. If the keyboard is not present, the standard PC/AT BIOS will report an error or fail during power-on self-test (POST) after a reset. The product's BIOS standard setup menu allows you to select "All, But Keyboard" under the "Halt On" selection. This allows no-keyboard operation in embedded system applications, without the system halting under POST.

2.2.2.14 Ethernet Configuration

The board is equipped with 1 high performance 32-bit PCI-bus Ethernet interface which is fully compliant with IEEE 802.3 10/100Mbps. It is supported by all major network operating systems.

100Base-T connector (CN19)

100Base-T connections are made via the on-board RJ-45 connector

Network boot (Depends on Ethernet Controller Gigabit Ethernet only)

The Network Boot feature can be utilized by incorporating the Boot ROM image files for the appropriate network operating system. The Boot ROM BIOS files are included in the system BIOS, which is on the utility CD disc.

2.2.2.15 PC/104 Connector

Supports PCI to ISA interface via PC/104 (CN20) connector

Supports full ISA compatible functions

Socket2: 20 x 2 (F) 2.54 mm 51.86 mm x 5.01 mm x 11.45 mm p = 3.40 mm

Socket3: 32 x 2 (F) 2.5 4mm 82.34 mm x 5.01 mm x 11.45 mm p = 3.40 mm

PC/104 negative voltage:

One 3 x 1-pin wafer box (CN23) supports -5 V/-12 V power input for ISA devices.

2.3 Mechanical

2.3.1 Jumper and Connector Location

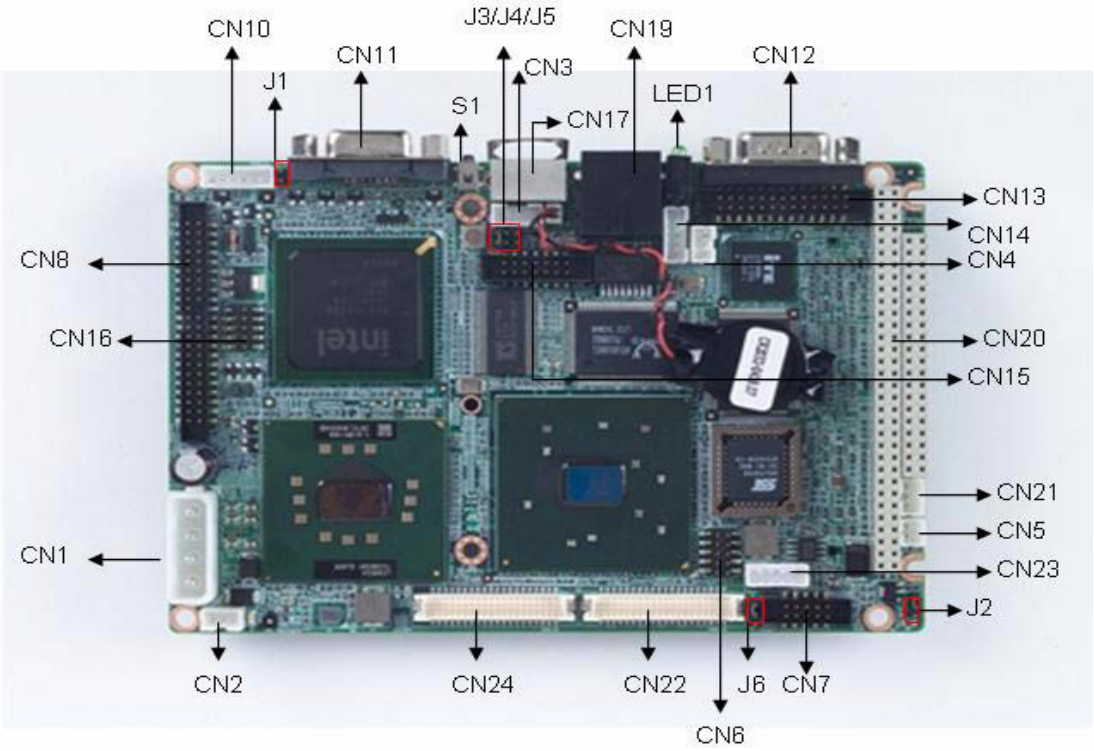


Figure 2.1 PCM-9388 Jumper and Connector Layout (Component Side)

Figure 2.2 PCM-9388 Jumper and Connector Layout (Solder Side)

2.3.2 Board Dimensions

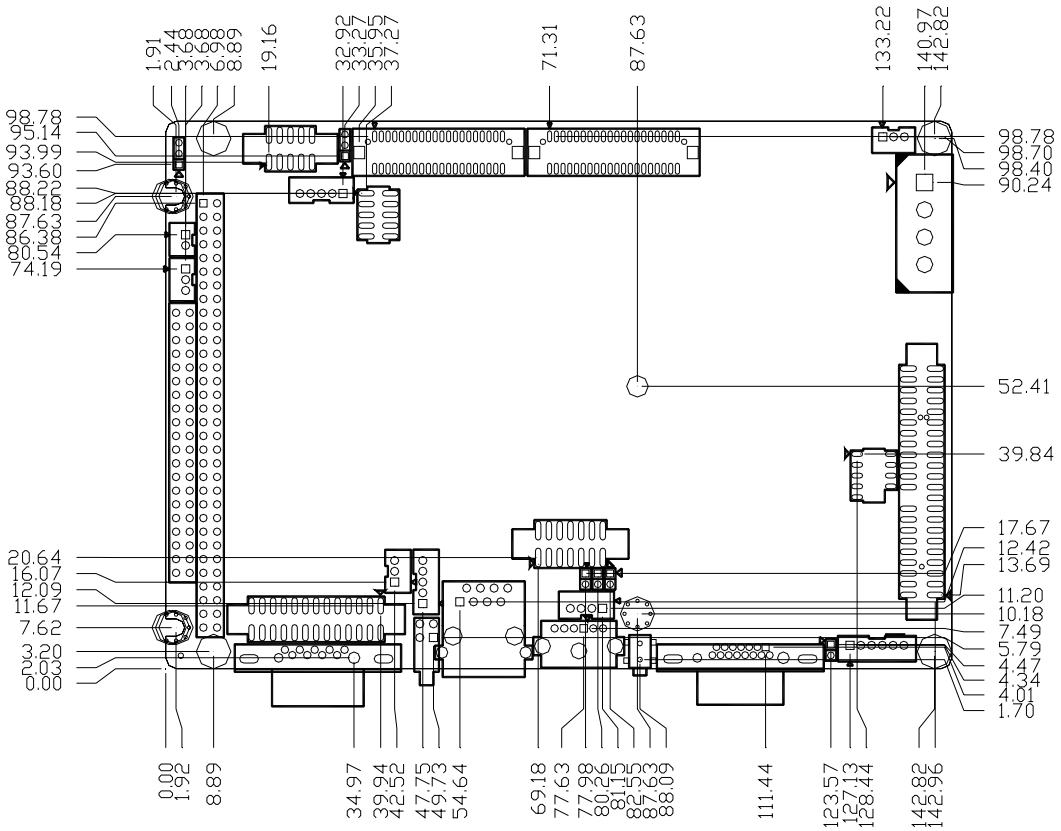


Figure 2.3 Board Dimensions (Component Side)

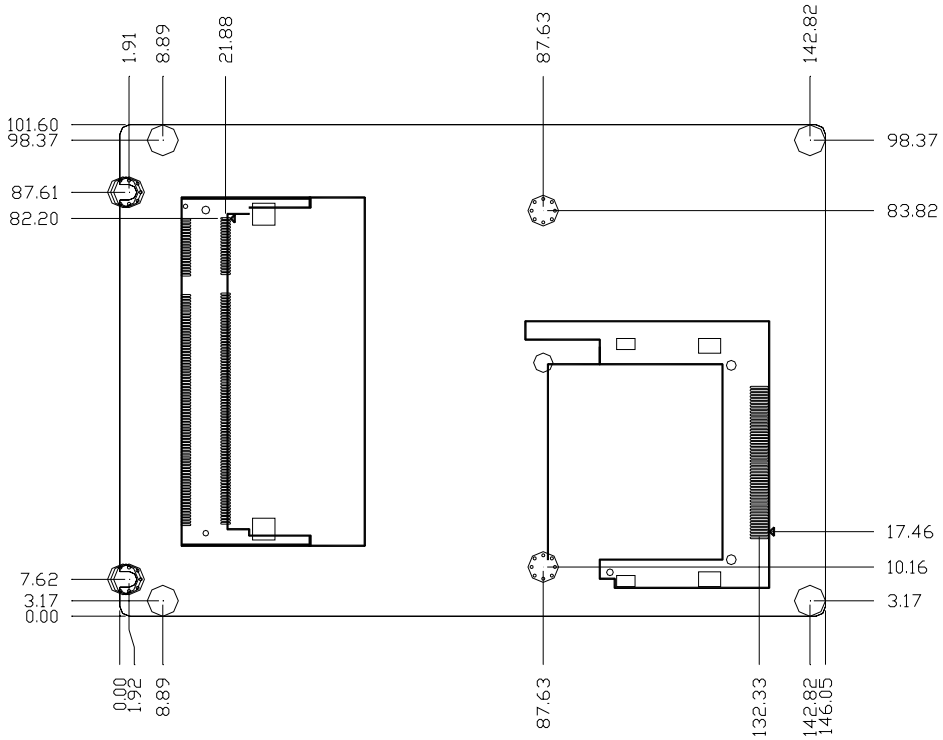


Figure 2.4 Board Dimensions (Solder Side)

Chapter 3

BIOS Operation

Sections include:

- **BIOS Introduction**
- **BIOS Setup**

3.1 BIOS Introduction

We try to provide a full-featured AwardBIOS 6.0 and delivers the superior performance, compatibility and functionality in the manufacture of Industry PC and Embedded boards. It's many options and extensions let you customize your products to a wide range of designs and target markets.

The modular, adaptable AwardBIOS 6.0 supports the broadest range of third-party peripherals and all popular chipsets, plus Intel, AMD, nVidia, VIA, and compatible CPUs from 386 through Pentium and AMD Geode, K7 and K8 (including multiple processor platforms), and VIA Eden C3 and C7 CPUs.

You can use our utilities to select and install features to suit your designs for your customers needs.

3.2 BIOS Setup

The PCM-9388 has a built-in AwardBIOS with a CMOS SETUP utility which allows users to configure required settings or to activate certain system features.

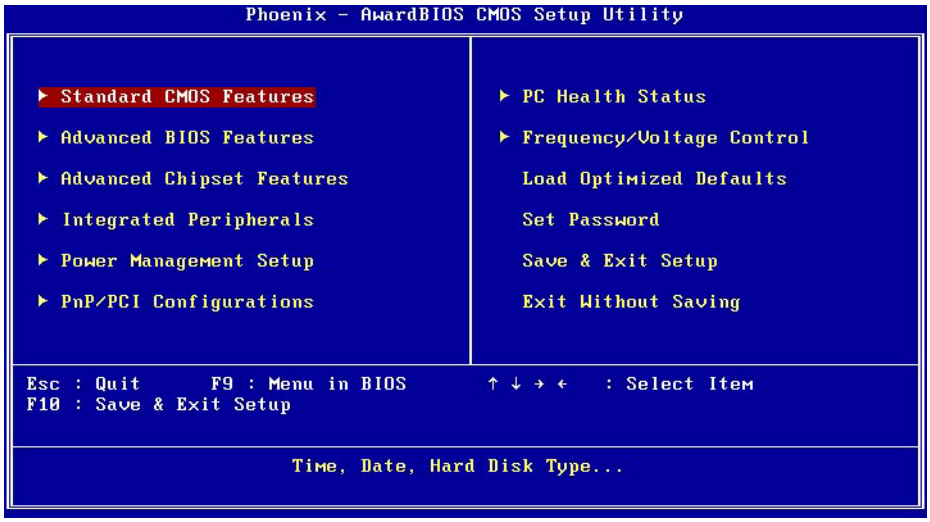
The CMOS SETUP saves the configuration in the CMOS RAM of the motherboard. When the power is turned off, the battery on the board supplies the necessary power to the CMOS RAM.

When the power is turned on, pressing the <Del> button during the BIOS POST (Power-On Self Test) will take you to the CMOS SETUP screen.

CONTROL KEYS	
< ↑ >< ↓ >< ← >< → >	Move to select item
<Enter>	Select Item
<Esc>	Main Menu - Quit and not save changes into CMOS
	Sub Menu - Exit current page and return to Main Menu
<Page Up/+>	Increase the numeric value or make changes
<Page Down/->	Decrease the numeric value or make changes
<F1>	General help, for Setup Sub Menu
<F2>	Item Help
<F5>	Load Previous Values
<F7>	Load Optimized Default
<F10>	Save all CMOS changes

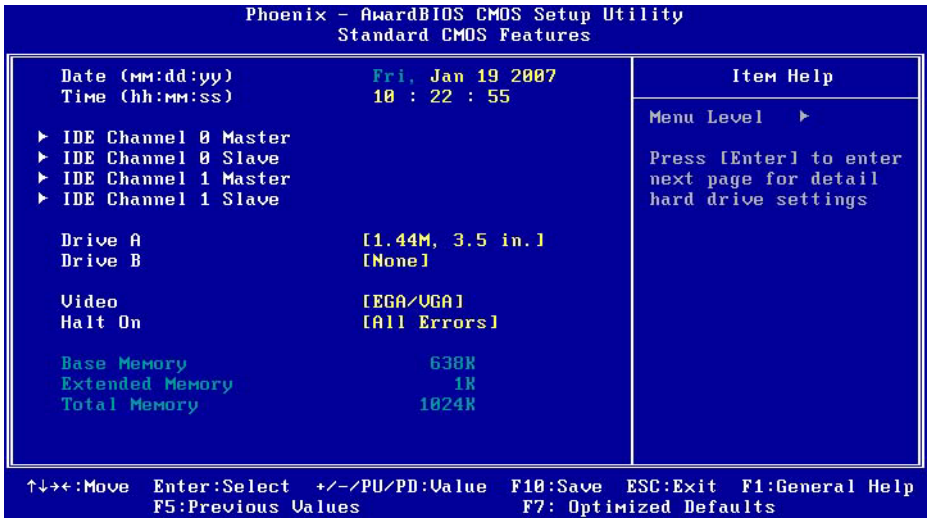
3.2.1 Main Menu

Press <Del> to enter AwardBIOS CMOS Setup Utility, the Main Menu will appear on the screen. Use arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.



- Standard CMOS Features
  This setup page includes all the items in standard compatible BIOS.
- Advanced BIOS Features
  This setup page includes all the items of Award BIOS enhanced features.
- Advanced Chipset Features
  This setup page includes all the items of Chipset configuration features.
- Integrated Peripherals
  This setup page includes all onboard peripheral devices.
- Power Management Setup
  This setup page includes all the items of Power Management features.
- PnP/PCI Configurations
  This setup page includes PnP OS and PCI device configuration.
- PC Health Status
  This setup page includes the system auto detect CPU and system temperature, voltage, fan speed.
- Frequency/Voltage Control
  This setup page includes CPU host clock control, frequency ratio and voltage.
- Load Optimized Defaults
  This setup page includes Load system optimized value, and the system would be in best performance configuration.
- Set Password
  Establish, change or disable password.
- Save & Exit Setup
  Save CMOS value settings to CMOS and exit BIOS setup.
- Exit Without Saving
  Abandon all CMOS value changes and exit BIOS setup.

3.2.2 Standard CMOS Features


Phoenix - AwardBIOS CMOS Setup Utility
Standard CMOS Features
Date (mm:dd:yy) Fri, Jan 19 2007
Time (hh:mm:ss) 10 : 22 : 55
IDE Channel 0 Master
IDE Channel 0 Slave
IDE Channel 1 Master
IDE Channel 1 Slave
Drive A [1.44M, 3.5 in.]
Drive B [None]
Video [EGA/VGA]
Halt On [All Errors]
Base Memory 638K
Extended Memory 1K
Total Memory 1024K
Item Help
Menu Level ▶
Press [Enter] to enter next page for detail hard drive settings
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

- Date

  The date format is <week>, <month>, <day>, <year>.

Week	From Sun to Sat, determined and display by BIOS only
Month	From Jan to Dec
Day	From 1 to 31
Year	From 1999 through 2098

- Time

  The time format in <hours> <minutes> <seconds>, based on 24-hour time

- IDE Channel 0 Master/Slave

  IDE HDD Auto-Detection Press "Enter" for automatic device detection.

- Drive A/Drive B

  The Item identifies the types of floppy disk drive A or drive B

None	No floppy drive installed
360 K, 5.25"	5.25 inch PC-type standard drive; 360 K byte capacity
1.2 M, 5.25"	5.25 inch AT-type high-density drive; 1.2 M byte capacity
720 K, 3.5"	3.5 inch double-sided drive; 720 K byte capacity
1.44 M, 3.5"	3.5 inch double-sided drive; 1.44 M byte capacity
2.88 M, 3.5"	3.5 inch double-sided drive; 2.88 M byte capacity

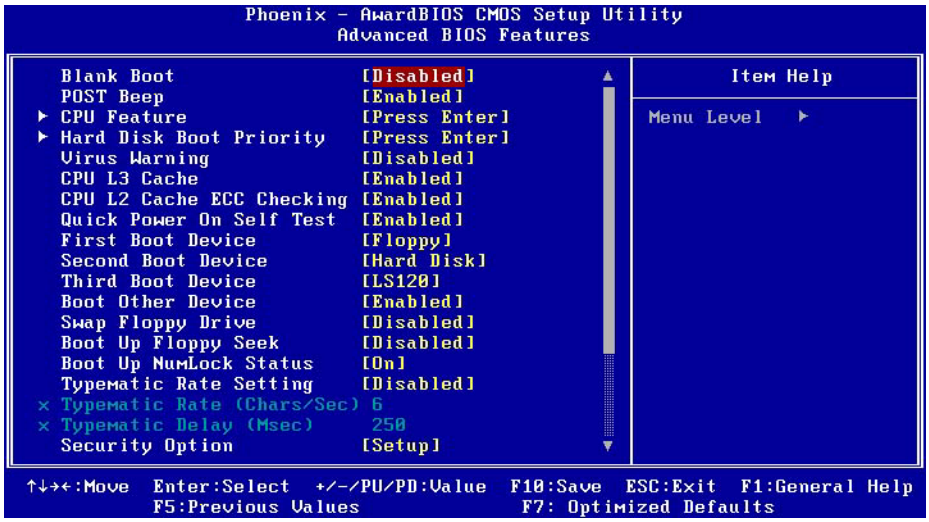
- Halt on

  The item determines whether the computer will stop if an error is detected during power up.

No Errors	The system boot will not stop for any error
All Errors	Whenever the BIOS detects a non-fatal error the system will be stopped.
All, But Keyboard	The system boot will not stop for a keyboard error; it will stop for all other errors. (Default value)
All, But Diskette	The system boot will not stop for a disk error; it will stop for all other errors.
All, But Disk/Key	The system boot will not stop for a keyboard or disk error; it will stop for all other errors.

- Base Memory
  The POST of the BIOS will determine the amount of base (or conventional) memory installed in the system.
- Extended Memory
  The POST of the BIOS will determine the amount of extended memory (above 1 MB in CPU's memory address map) installed in the system.
- Total Memory
  This item displays the total system memory size.

3.2.3 Advanced BIOS Features


Phoenix - AwardBIOS CMOS Setup Utility
Advanced BIOS Features
Blank Boot [Disabled]
POST Beep [Enabled]
CPU Feature [Press Enter]
Hard Disk Boot Priority [Press Enter]
Virus Warning [Disabled]
CPU L3 Cache [Enabled]
CPU L2 Cache ECC Checking [Enabled]
Quick Power On Self Test [Enabled]
First Boot Device [Floppy]
Second Boot Device [Hard Disk]
Third Boot Device [LS120]
Boot Other Device [Enabled]
Swap Floppy Drive [Disabled]
Boot Up Floppy Seek [Disabled]
Boot Up NumLock Status [On]
Typematic Rate Setting [Disabled]
Typematic Rate (Chars/Sec) 6
Typematic Delay (Msec) 250
Security Option [Setup]
Item Help
Menu Level
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

- Blank Boot [Disabled] (* feature enhancement)
  This item allows system only displays blank screen during BIOS Post stage.
- POST Beep [Enabled] (* feature enhancement)
  This item allows system send out Beep sound during BIOS Post stage.
- CPU Feature
  This item allows user to adjust CPU features, CPU ratio, VID and Thermal and special feature like XD flag.
- Hard Disk Boot Priority
  This item allows user to select boot sequence for system device HDD, SCSI, RAID.
- Virus Warning [Disabled]
  This item allows user to choose the VIRUS Warning feature for IDE Hard Disk boot sector protection.
- CPU L3 Cache [Enabled]
  This item allows user to enable CPU L3 cache.
- CPU L2 Cache ECC Checking [Enabled]
  This item allows user to enable CPU L2 cache and ECC checking function.
- Quick Power On Self Test [Enabled]
  This field speeds up the Power-On Self Test (POST) routine by skipping retesting a second, third and forth time. Setup setting default is enabled.
- First / Second / Third / Other Boot Drive

Floppy	Select boot device priority by Floppy.
LS120	Select boot device priority by LS120.

Hard Disk	Select boot device priority by Hard Disk.
CDROM	Select boot device priority by CDROM.
ZIP	Select boot device priority by ZIP.
USB-FDD	Select boot device priority by USB-FDD.
USB-ZIP	Select boot device priority by USB-ZIP.
USB-CDROM	Select boot device priority by USB-CDROM.
USB-HDD	Select boot device priority by USB-HDD.
LAN	Select boot device priority by LAN.
Disabled	Disable this boot function.

- Swap Floppy Drive [Disabled]

  This item enables users to swap floppy drives identified as “A” and “B” without changing the hardware cable connection.
- Boot Up Floppy Seek [Disabled]

  When enabled, the BIOS will seek the floppy “A” drive one time.
- Boot Up NumLock Status [Disabled]

  This item enables users to activate the Number Lock function upon system boot.
- Typematic Rate Setting

This item enables users to set the two typematic control items.

This field controls the speed at

  – Typematic Rate (Chars/Sec)

    This item controls the speed at system registers repeated keystrokes.

    Eight settings are 6, 8, 10, 12, 15, 20, 24 and 30.

  – Typematic Delay (Msec)

    This item sets the time interval for displaying the first and second characters. Four delay rate options are 250, 500, 750 and 1000.

- Security Option[Setup]

System	System can not boot and can not access Setup page if the correct password is not entered at the prompt.
Setup	System will boot, but access Setup if the correct password is not entered at the prompt. (Default value)

- MPS Version Control for OS [1.4]

  This item sets the operating system multiprocessor support version.
- OS Select For DRAM > 64M [Non-OS2]

  Select OS/2 only if system is running OS/2 operating system with greater than 64MB of RAM on the system
- Video BIOS Shadow [Enabled]

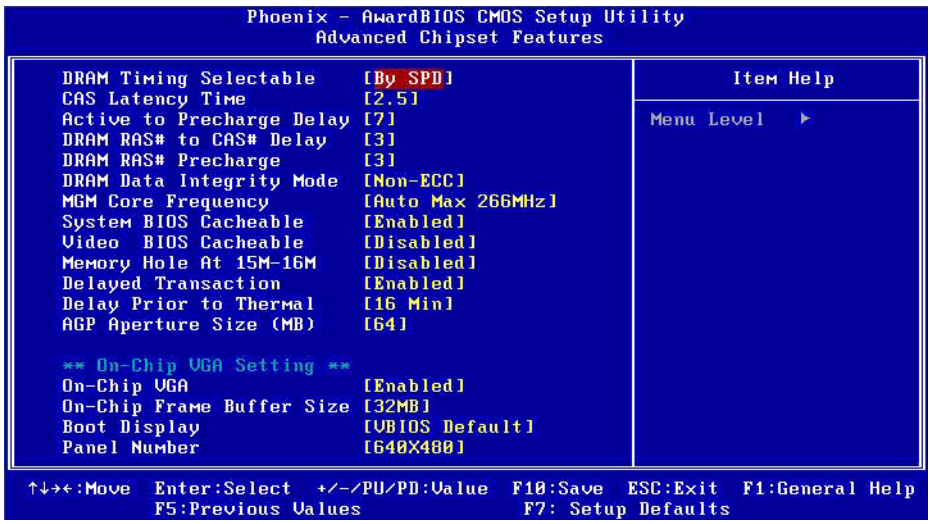
  Enabled copies Video BIOS to shadow RAM improves performance
- Full Screen Logo Show [Enabled]

  Show full screen logo during post stage, and the Logo picture can be customized.
- Small Logo (EPA) Show [Enabled]

  Show EPA logo during system post stage.
- Summary Screen Show [Enabled]

  Show system status in Summary screen page.

3.2.4 Advanced Chipset Features


Phoenix - AwardBIOS CMOS Setup Utility
Advanced Chipset Features
DRAM Timing Selectable [By SPD]
CAS Latency Time [2.5]
Active to Precharge Delay [7]
DRAM RAS# to CAS# Delay [3]
DRAM RAS# Precharge [3]
DRAM Data Integrity Mode [Non-ECC]
MGM Core Frequency [Auto Max 266MHz]
System BIOS Cacheable [Enabled]
Video BIOS Cacheable [Disabled]
Memory Hole At 15M-16M [Disabled]
Delayed Transaction [Enabled]
Delay Prior to Thermal [16 Min]
AGP Aperture Size (MB) [64]
** On-Chip VGA Setting **
On-Chip VGA [Enabled]
On-Chip Frame Buffer Size [32MB]
Boot Display [VBIOS Default]
Panel Number [640X480]
Item Help
Menu Level ▶
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Setup Defaults

Note! *The "Advanced Chipset Features" option controls the configuration of the board's chipset and is chipset independent, for controlling chipset register settings and fine tuning system performance. It is strongly recommended only technical users make changes to the default settings.*

- DRAM Timing Selectable [By SPD]

  This item enables users to set the optimal timings for items 2 through 5, system default setting of “By SPD” to follow the SPD information and ensure the system running in stable and optimal performance.
- CAS Latency Time [Auto]

  This item enables users to set the timing delay in clock cycles before SDRAM starts a read command after receiving it.
- Active to Precharge Delay [7]

  This item enables users to control the memory back’s minimum row active time (tRAS); system default setting is “7”.
- DRAM RAS# to CAS# Delay [3]

  This item enables users to set the timing of the transition from RAS (row address strobe) to CAS (column address strobe) as both rows and column are separately addressed shortly after DRAM is refreshed.
- DRAM RAS# Precharge [3]

  This item enables users to set the DRAM RAS# precharge timing, system default setting is “3”.
- DRAM Data Integrity Mode [Non-ECC]

  This item enables users to set the DRAM Type of Error data correction, system default setting is “Non-ECC”.
- MGM Core Frequency [Auto Max 266MHz]

  This item enables users to set the operation speed of internal Graphic Chip FSB and DRAM, system default setting is “Auto Max 266 MHz”.
- System BIOS Cacheable [Enabled]

  This item allows the system BIOS to be cached to allow faster execution and better performance.
- Video BIOS Cacheable [Disabled]

This item allows the video BIOS to be cached to allow faster execution and better performance.

- Memory Hole At 15 M-16 M [Disabled]

  This item reserves 15 MB-16 MB memory address space to ISA expansion cards that specifically require the setting. Memory from 15 MB-16 MB will be unavailable to the system because the expansion cards can only access memory at this area.

- DRAM Data Integrity Mode [Non-ECC]

  This item enables users to set the DRAM Type of Error data correction, system default setting is “Non-ECC”.

- Delayed Transaction [Enabled]

  This items enables users to activate the PCI delayed Transaction feature; it can improve PCI performance and meet PCI 2.1 specifications.

- Delay Period to Thermal [16 Min]

  This items enables users to select the time period the system uses to detect CPU Thermal condition; system default setting is “16 Min”.

- AGP Aperture Size (MB) [64]

  This item enables users to select size of system memory to support AGP graphic usage, system default setting is “64 MB”.

- On-Chip VGA Setting

  This platform supports On-Chip VGA function and will continue to support VGA related settings.

- On-Chip VGA [Enabled]

  This item enables users to Enable or Disable On-Chip VGA devices, system default setting is “Enabled”.

- On-Chip Frame Buffer Size [32MB]

  This Item enables users to set Video Memory size, system default setting is “32MB”.

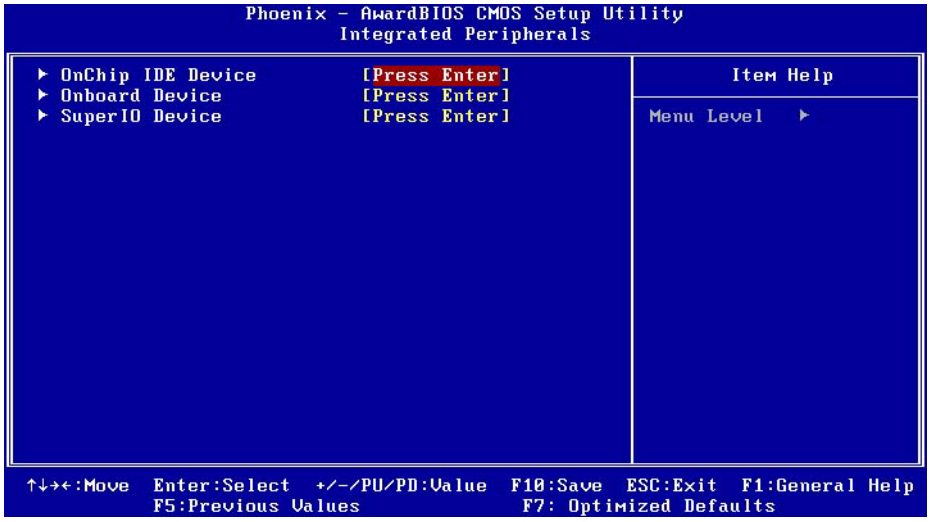
- Boot Display [VBIOS Default]

  This Item enables users to set Initial display device of system boot up, system default setting is “VBIOS Default”.

- Panel Number [640 X 480]

  This item enables users to set the Resolution of Panel Type, system default setting ia “640 X 480”.

3.2.5 Integrated Peripherals


Phoenix - AwardBIOS CMOS Setup Utility
Integrated Peripherals
OnChip IDE Device [Press Enter]
Onboard Device [Press Enter]
SuperIO Device [Press Enter]
Item Help
Menu Level
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

Note! *The "Integrated Peripherals" option controls the configuration of the board's chipset, including IDE, ATA, SATA, USB, AC97, MC97 and Super IO and Sensor devices; it is chipset independent.*

- OnChip IDE Device

  This item enables users to set the OnChip IDE device status, including enabling IDE devices and setting PIO and DMA access mode. Some new chipsets also support SATA devices (Serial-ATA).

- Onboard Device

  This item enables users to set the Onboard device status, including enabling USB, AC97, MC97 and LAN devices.

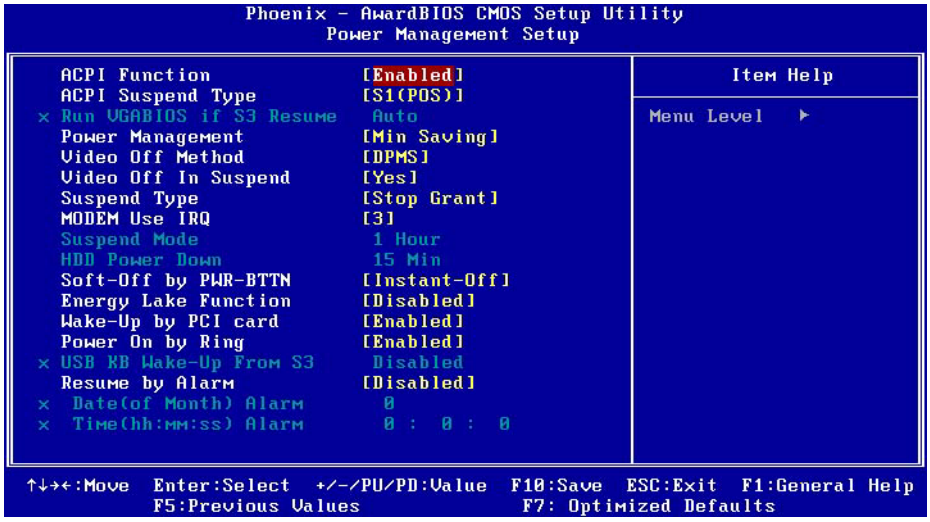
- Super IO Device

  This item enables users to set the Super IO device status, including enabling Floppy, COM, LPT, IR and control GPIO and Power fail status.

- Onboard Serial port 1 [3F8]

  This item allows user to adjust serial port 1 of address.

3.2.6 Power Management Setup


Phoenix - AwardBIOS CMOS Setup Utility
Power Management Setup
ACPI Function [Enabled]
ACPI Suspend Type [S1(POS)]
× Run VGABIOS if S3 Resume Auto
Power Management [Min Saving]
Video Off Method [DPMS]
Video Off In Suspend [Yes]
Suspend Type [Stop Grant]
MODEM Use IRQ [3]
Suspend Mode 1 Hour
HDD Power Down 15 Min
Soft-Off by PWR-BTTN [Instant-Off]
Energy Lake Function [Disabled]
Wake-Up by PCI card [Enabled]
Power On by Ring [Enabled]
× USB KB Wake-Up From S3 Disabled
Resume by Alarm [Disabled]
× Date(of Month) Alarm 0
× Time(hh:mm:ss) Alarm 0 : 0 : 0
Item Help
Menu Level ▸
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

Note! *The "Power management Setup" option configures system to most effectively save energy while operating in a manner consistent with your style of computer use.*

- ACPI Function [Enabled]

  This item defines the ACPI (Advanced Configuration and Power Management) feature that makes hardware status information available to the operating system, and communicates to PC and system devices for improving power management.

- ACPI Suspend Type [S1 (POS)]

  This item allows users to select sleep state when suspended.

S1(POS)	The suspend mode is equivalent to a software power down;
S3(STR)	The system shuts down with the exception of a refresh current to the system memory.

- Run VGA BIOS if S3 Resume [Auto]

  This item allows the system to reinitialize VGA BIOS after a system resume from ACPI S3 mode.

- Power Management [Min Saving]

  This item allows users to select system power saving mode.

Min Saving	Minimum power management. Suspend Mode=1 hr.
Max Saving	Maximum power management. Suspend Mode=1 min.
User Define	Allows user to set each mode individually. Suspend

  Mode= Disabled or 1 min ~1 hr.

- Video Off Method [DPMS]

  This item allows user to determine the manner is which the monitor is blanked.

V/H SYNC+Blank	This option will cause system to turn off vertical and horizontal synchronization ports and write blanks to the video buffer.
Blank Screen	This option only writes blanks to the video buffer.
DPMS	Initial display power management signaling.

- Video Off In Suspend [Yes]

This item allows user to turn off Video during system entering suspend mode.

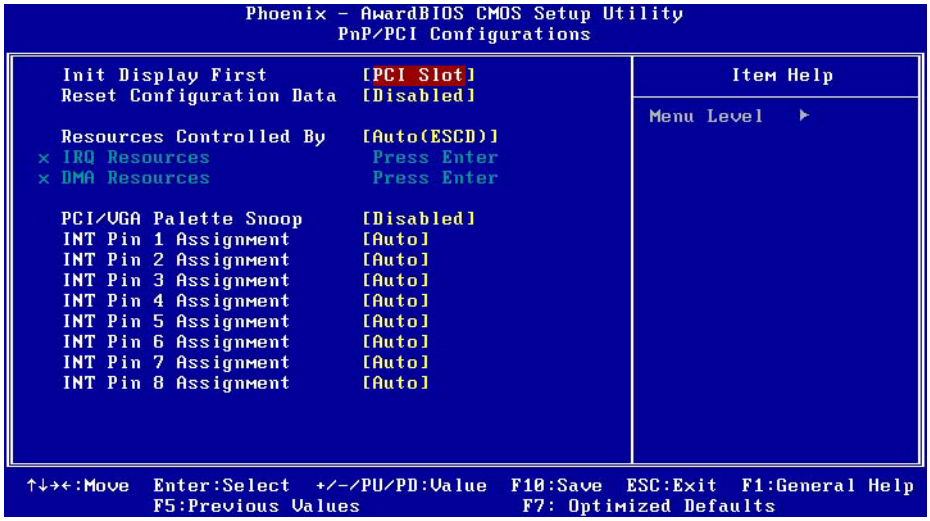
- Suspend Type [Stop Gran]
  This item allows user to determine the suspend type.
- Modem use IRQ [3]
  This item allows user to determine the IRQ which the MODEM can use.
- Suspend Mode [1 Hour]
  This item allows user to determine the time of system inactivity, all devices except the CPU will be shut off.
- HDD Power Down Mode [15 Min]
  This item allows user to determine the time of system inactivity after which the hard disk drive will be powered down.
- Soft-Off by PWR-BTTN [Enabled]]
  This item allows user to define function of power button.

Instant-Off	Press power button then Power off instantly.
Delay 4 Sec	Press power button 4 sec. to Power off.

- Wake-Up by PCI card [Enabled]
  This item allows users to defines PCI cards to wake up the system from suspend mode.
- Power On by Ring[Enabled]
  This item allows users to define the system to resume by activating of a modem ring.
- USB KB Wake-Up From S3 [Enabled]
  This item allows users to enable using a USB keyboard, and allowing a keystroke to wake up the system from power saving mode.
- Resume by Alarm [Disabled]
  This item allows user to enable and key in Date/time to power on system

Disabled	Disable this function.
Enabled	Enable alarm function to power on system
Date (of month)	Alarm 1-31
Time (HH:MM:SS)	Alarm (0-23) : (0-59) : 0-59)

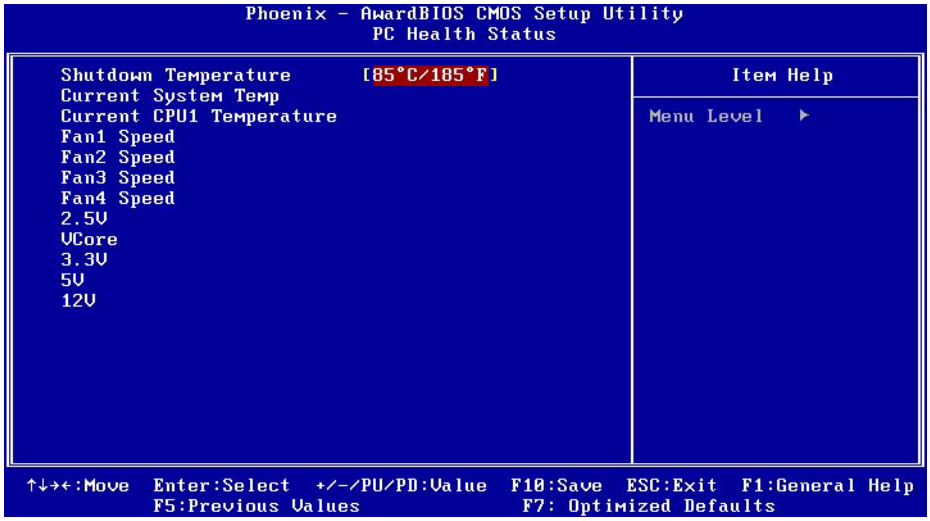
3.2.7 PnP/PCI Configurations


Phoenix - AwardBIOS CMOS Setup Utility
PnP/PCI Configurations
Init Display First [PCI Slot]
Reset Configuration Data [Disabled]
Resources Controlled By [Auto(ESCD)]
× IRQ Resources Press Enter
× DMA Resources Press Enter
PCI/VGA Palette Snoop [Disabled]
INT Pin 1 Assignment [Auto]
INT Pin 2 Assignment [Auto]
INT Pin 3 Assignment [Auto]
INT Pin 4 Assignment [Auto]
INT Pin 5 Assignment [Auto]
INT Pin 6 Assignment [Auto]
INT Pin 7 Assignment [Auto]
INT Pin 8 Assignment [Auto]
Item Help
Menu Level ▸
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

Note! *The "PnP/PCI Configurations" option is used to set up the IRQ and DMA resources (both PnP and PCI bus assignments).*

- Init Display First [PCI Slot]
  This item is setting for start up Video output from PCI or Onboard device.
- Reset Configuration Data[Disabled]
  This item allow user to clear any PnP configuration data stored in the BIOS.
- Resources Controlled By[Auto (ESCD)]
  - IRQ Resources
    This item allows you respectively assign an interrupt type for IRQ-3, 4, 5, 7, 9, 10, 11, 12, 14, and 15.
  - DMA Resources
    This item allows you respectively assign an interrupt type for DMA, 0, 1, 2, 3, 4, 5, 6, and 7.
- PCI VGA Palette Snoop[Disabled]
  The item is designed to solve problems caused by some non-standard VGA cards. A built-in VGA system does not need this function.
- INT Pin 1 ~ 8 Assignment[Auto]
  The interrupt request (IRQ) assigned to devices connected to the PCI interface on your system.

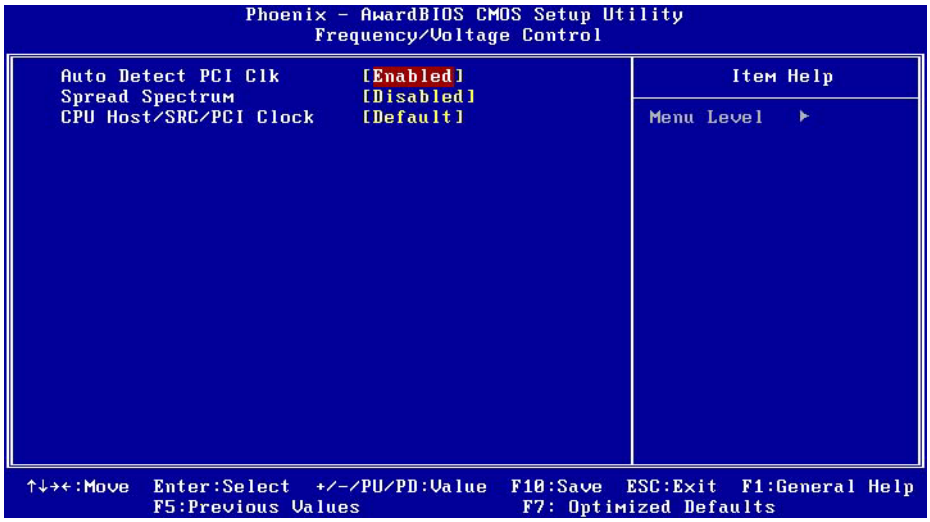
3.2.8 PC Health Status



Note! The "PC Health Status" option controls the Thermal, FAN and Voltage status of the board. It is chipset independent.

- Shutdown Temperature [Disabled]
  This item enables users to set the limits for CPU temperature; the range is from 85 ~ 100° C.
- Current System/CPU Temperature [Show Only]
  This item displays current CPU temperature.
- FAN 1 / FAN2 / FAN3 / FAN4 Speed [Show Only]
  This item displays current system FAN speed.
- 2.5 V / 3.3 V / 5 V / 12 V and VCore [Show Only]
  This item displays current CPU and system Voltage.

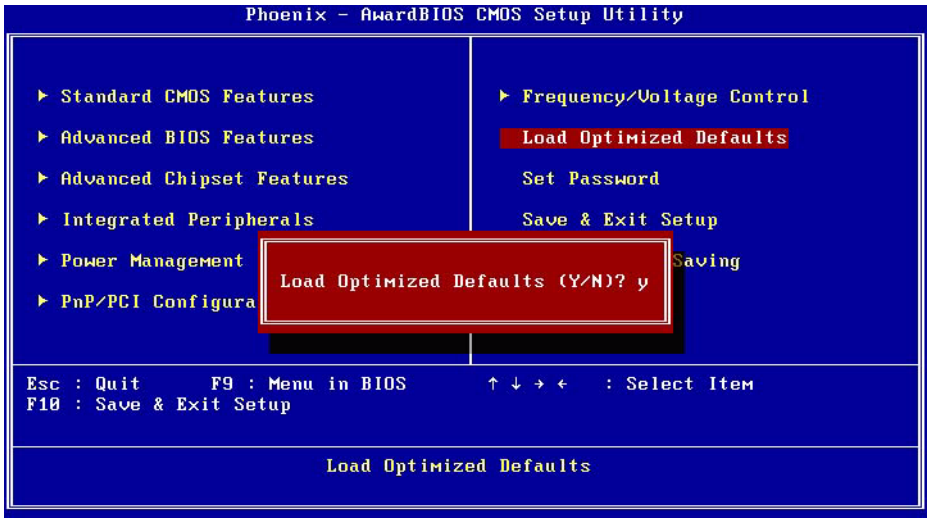
3.2.9 Frequency/Voltage Control


Phoenix - AwardBIOS CMOS Setup Utility
Frequency/Voltage Control
Auto Detect PCI Clk [Enabled]
Spread Spectrum [Disabled]
CPU Host/SRC/PCI Clock [Default]
Item Help
Menu Level ▸
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

Note! *The "Frequency/Voltage Control" option controls the CPU Host and PCI frequency; it is both CPU and Chipset independent. Some items will display only when you install a processor which supports this function.*

- Auto Detect PCI Clk [Enabled]
  This item enables users to set the PCI Clk by system automatic detection or manually.
- Spread Spectrum [Disabled]
  This item enables users to set the spread spectrum modulation.
- CPU Host/SRC/PCI Clock [Default]
  This item enables users to set the CPU Host and PCI clock by system automatic detection or manually

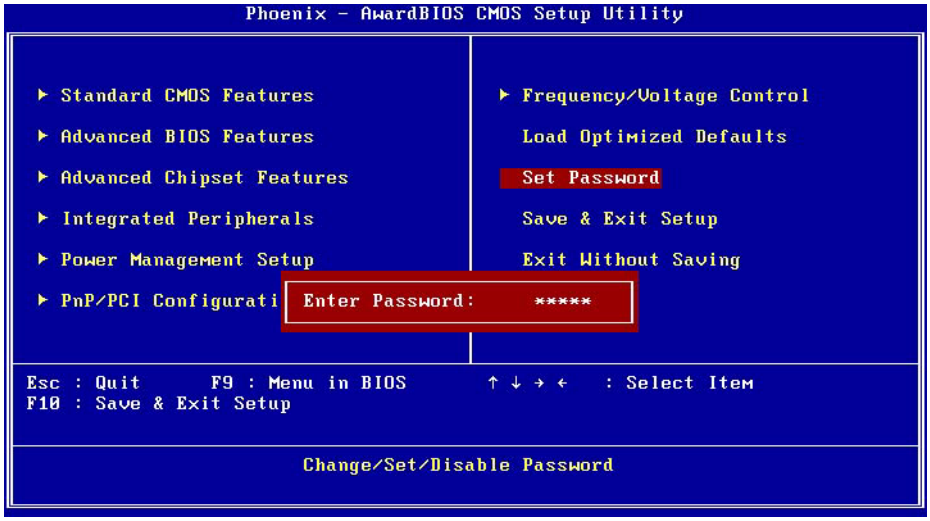
3.2.10 Load Optimized Defaults



Note! *Load Optimized Defaults loads the default system values directly from ROM, if the stored record created by the Setup program should ever become corrupted (and therefore unusable).*

These defaults will load automatically when you turn on the PCM-9388.

3.2.11 Set Password



Note! *To enable this feature, you should first go to the Advanced BIOS Features menu, choose the Security Option, and select either Setup or System, depending on which setting you want password protected. Selecting "Setup" requires a password only to enter Setup. Selecting "System" requires the password either to enter Setup or to boot the system. A password may be at most 8 characters long.*

To Establish Password

1. Choose the Set Password option from the CMOS Setup Utility main menu and press <Enter>.
2. When you see "Enter Password", enter the desired password and press <Enter>.
3. At the "Confirm Password" prompt, retype the desired password, then press <Enter>.
4. Select Save to CMOS and EXIT, type <Y>, then <Enter>.

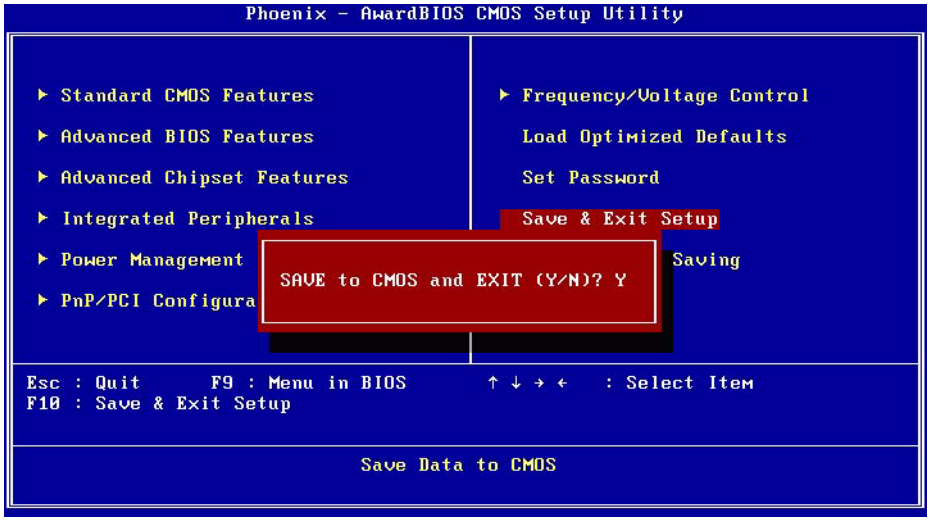
To Change Password

1. Choose the Set Password option from the CMOS Setup Utility main menu and press <Enter>.
2. When you see "Enter Password", enter the existing password and press <Enter>.
3. You will see "Confirm Password". Type it again, and press <Enter>.
4. Select Set Password again, and at the "Enter Password" prompt, enter the new password and press <Enter>.
5. At the "Confirm Password" prompt, retype the new password, and press <Enter>.
6. Select Save to CMOS and EXIT, type <Y>, then <Enter>.

To Disable Password

1. Choose the Set Password option from the CMOS Setup Utility main menu and press <Enter>.
2. When you see “Enter Password”, enter the existing password and press <Enter>.
3. You will see “Confirm Password”. Type it again, and press <Enter>.
4. Select Set Password again, and at the “Enter Password” prompt, don’t enter anything; just press <Enter>.
5. At the “Confirm Password” prompt, again, don’t type in anything; just press <Enter>.
6. Select Save to CMOS and EXIT, type <Y>, then <Enter>.

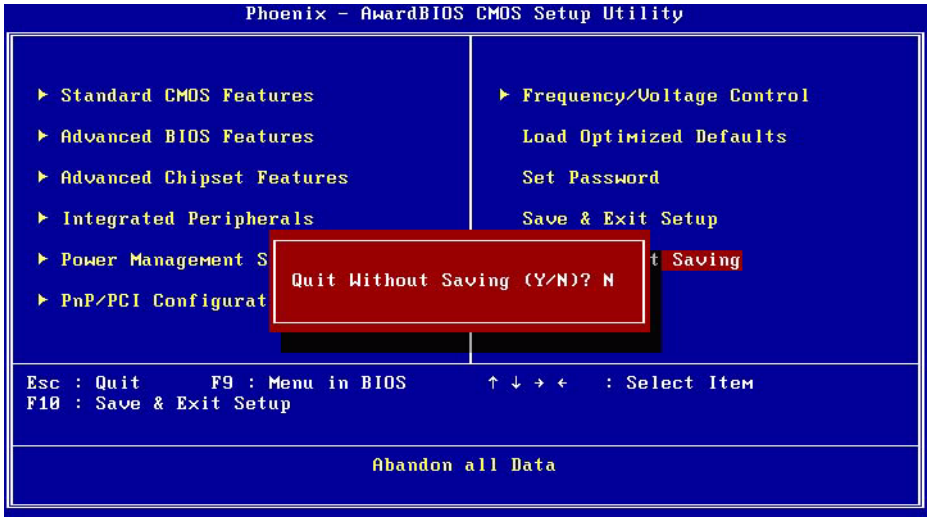
3.2.12 Save & Exit Setup


Phoenix - AwardBIOS CMOS Setup Utility
Standard CMOS Features
Advanced BIOS Features
Advanced Chipset Features
Integrated Peripherals
Power Management
PnP/PCI Configura
Frequency/Voltage Control
Load Optimized Defaults
Set Password
Save & Exit Setup
Saving
SAVE to CMOS and EXIT (Y/N)? Y
Esc : Quit F9 : Menu in BIOS ↑ ↓ → ← : Select Item
F10 : Save & Exit Setup
Save Data to CMOS

Note! *Typing "Y" will quit the BIOS Setup Utility and save user setup value to CMOS.*

Typing "N" will return to the BIOS Setup Utility.

3.2.13 Quit Without Saving


Phoenix - AwardBIOS CMOS Setup Utility
Standard CMOS Features
Advanced BIOS Features
Advanced Chipset Features
Integrated Peripherals
Power Management S
PnP/PCI Configurat
Frequency/Voltage Control
Load Optimized Defaults
Set Password
Save & Exit Setup
t Saving
Quit Without Saving (Y/N)? N
Esc : Quit F9 : Menu in BIOS ↑ ↓ → ← : Select Item
F10 : Save & Exit Setup
Abandon all Data

Note! *Typing "Y" will quit the BIOS Setup Utility without saving to CMOS.*

Typing "N" will return to the BIOS Setup Utility.

Chapter 4

S/W Introduction & Installation

Sections include:

- S/W Introduction
- Driver Installation
- SUSI Application Library

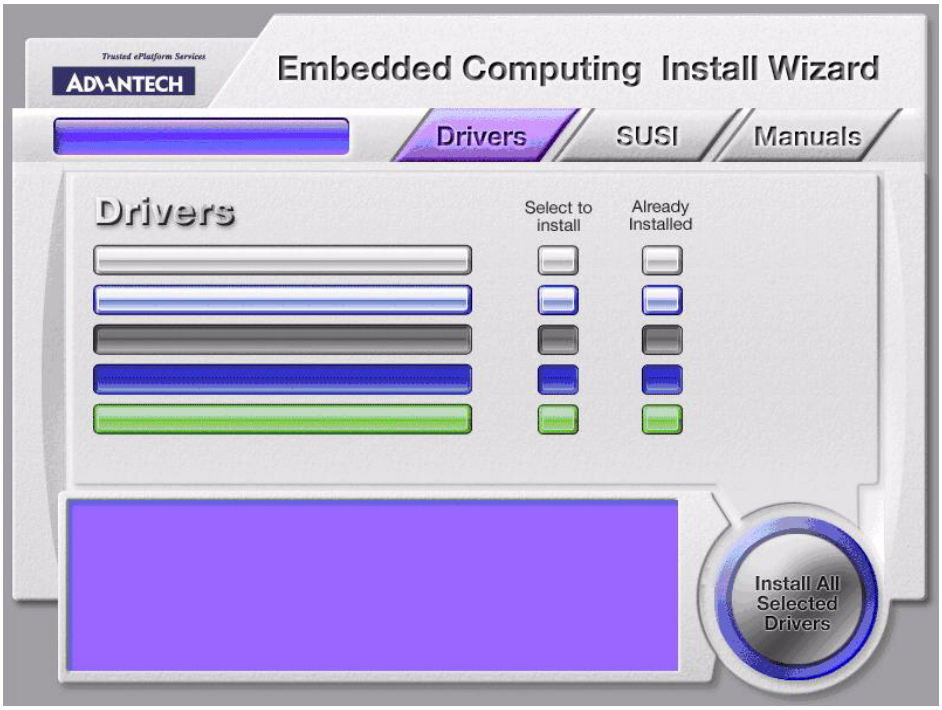
4.1 S/W Introduction

The mission of our Embedded Software Services is to: "Enhance the quality of life with embedded platforms and Microsoft Windows Embedded technology". We enable Windows Embedded software products on our platforms to more effectively support the embedded computing community. Customers are freed from the hassle of dealing with multiple vendors (Hardware suppliers, System integrators, Embedded OS distributor) for projects. Our goal is to make Windows Embedded Software solutions easily and widely available to the embedded computing community.

4.2 Driver Installation

4.2.1 Windows XP Professional

To install the drivers for Windows XP Professional, insert the CD into the CD-Rom, it will auto-detect the hardware platform and then pop up the “Embedded Computing Install Wizard” box; select the drivers that you want to install and click “Install All Selected Drivers”. Follow the Driver Setup Wizard instructions; click "Next" to complete the installation.



4.2.2 Other OS Installations

To install the drivers for Other Windows OS or Linux installations, please find the appropriate chipset folder on the CD to run the setup file.

4.3 SUSI Application Library

4.3.1 SUSI Introduction

To make hardware easier and more convenient to access for programmers, we have released a suite of APIs (Application Programming Interface) in the form of a program library. The program Library is called Secured and Unified Smart Interface or SUSI for short.

In modern operating systems, user space applications cannot access hardware directly. Drivers are required to access hardware. User space applications access hardware through drivers. Different operating systems usually define different interfaces for drivers. This means that user space applications call different functions for hardware access in different operating systems. To provide a uniform interface for accessing hardware, an abstraction layer is built on top of the drivers and SUSI is such an abstraction layer. SUSI provides a uniform API for application programmers to access the hardware functions in different Operating Systems and on different hardware platforms.

Application programmers can invoke the functions exported by SUSI instead of calling the drivers directly. The benefit of using SUSI is portability. The same set of APIs is defined for different hardware platforms. Also, the same set of APIs is implemented in different Operating Systems including Windows XP and Windows CE.
This user's manual describes some sample programs and the SUSI API. The hardware functions currently supported by SUSI can be grouped into a few categories including Watchdog, I2C, SMBus, GPIO, and VGA control. Each category of API in SUSI is briefly described below.

4.3.2 SUSI Functions

4.3.2.1 The GPIO API

General Purpose Input/Output (GPIO) is a flexible parallel interface that allows a variety of custom connections, and supports digital I/O devices.

4.3.2.2 The I^2C API

I^2C is a bi-directional two-wire bus that was developed by Philips for use in their televisions in the 1980s and nowadays is used in various types of embedded systems. The strict timing requirements defined in the I^2C protocol has been taken care of by SUSI. Instead of asking application programmers to figure out the strict timing requirements in the I^2C protocol, the I^2C API in SUSI can be used to control I^2C devices by invoking other function calls. SUSI provides a consistent programming interface for different boards. That means user programs using SUSI are portable among different boards as long as the boards and SUSI provide the required functionality. Overall product development times can be greatly reduced using SUSI.

4.3.2.3 The SMBus API

The System Management Bus (SMBus) is a two-wire interface defined by Intel Corporation in 1995. It is based on the same principles of operation of I^2C and is used in personal computers and servers for low-speed system management communications. Nowadays, it can be seen in many types of embedded systems. As with other API in SUSI, the SMBus API is available on many platforms including Windows XP and Windows CE.

4.3.2.4 The VGA Control API

There are two kinds of VGA control APIs, backlight on/off control and brightness control. Backlight on/off control allows a developer to turn on or off the backlight, and to control brightness smoothly.

4.3.2.5 The Watchdog API

A watchdog timer (abbreviated as WDT) is a hardware device which triggers an action, e.g. rebooting the system, if the system does not reset the timer within a specific period of time. The WDT API in SUSI provides developers with functions such as starting the timer, resetting the timer, and setting the timeout value if the hardware requires customized timeout values.

4.3.2.6 The Hardware Monitor API

The hardware monitor (abbreviated as HWM) is a system health supervision capability achieved by placing certain I/O chips along with sensors for inspecting the target of interests for certain condition indexes, such as fan speed, temperature and voltage etc.

However, due to the inaccuracy among many commercially available hardware monitoring chips, we have developed a unique scheme for hardware monitoring achieved by using a dedicated microprocessor with algorithms specifically designed for providing accurate, real-time and reliable data content; helping protect your system in a more reliable manner

4.3.3 SUSI Installation

SUSI supports many different operating systems. Each subsection below describes how to install SUSI and related software on a specific operating system. Please refer to the subsection matching your operating system.

4.3.3.1 Windows XP

In Windows XP, you can install the library, drivers and demo programs onto the platform easily using the installation tool - The SUSI Library Installer. After the installer has executed, the SUSI Library and related files for Windows XP can be found in the target installation directory. The files are listed in the following table.

Directory	Contents
\Library	■ Susi.lib Library for developing the applications on Windows XP. ■ Susi.dll Dynamic library for SUSI on Windows XP.
\Demo	■ SusiDemo.EXE Demo program on Windows XP. ■ Susi.dll Dynamic library for SUSI on Windows XP.
\Demo\SRC	Source code of the demo program on Windows XP.

The following section illustrates the installation process:

Note! *The version of the SUSI Library Installer shown on each screen shot below depends on your own particular version.*

1. Extract Susi.zip.
2. Double-click the "Setup.exe" file.

The installer searches for a previous installation of the SUSI Library. If it locates one, a dialog opens asking whether you want to modify, repair or remove the software. If it is not located, the dialog proceeds by asking you to click “Next”.

4.3.3.2 Windows CE

In Windows CE, there are three ways to install the SUSI Library, you can install it manually or use Windows CE-Builder to install the library or just copy the programs and the library onto a compact flash card.

Express Installation:

You can use Microsoft Windows CE-Builder to load the library onto the image.

- First, click the “My Component: tab.
- In this tab, click the “Add New Category” button to add a new category; for example, the SUSI Library.
- Then, add a new file to this category, and upload the version of SUSI.dll for the category.
- After completing these steps, the SUSI Library category you created is available for all of your projects.

Manual Installation:

You can add the SUSI Library onto the image by editing any bib file.

- First, open project.bib in the platform builder.
- Add this line to the MODULES section of project.bib
- Susi.dll$(_FLATRELEASEDIR)\Susi.dll NK SH
- If you want to run the window-based demo, add following line:
- SusiTest.exe$(_FLATRELEASEDIR)\SusiTest.exe
- If you want to run the console-based demo, add following lines:
- Watchdog.exe$(_FLATRELEASEDIR)\Watchdog.exe NK S
- GPIO.exe$(_FLATRELEASEDIR)\GPIO.exeNK S
- SMBUS.exe$(_FLATRELEASEDIR)\SMBUS.exeNK S
- Place the three files into any files directory.
- Build your new Windows CE operating system.

4.3.4 SUSI Sample Programs

4.3.4.1 Sample Programs

The sample programs demonstrate how to incorporate SUSI into your program. There are sample programs for two categories of operating system, i.e. Windows XP and Windows CE. The sample programs run in graphics mode in Windows XP and Windows CE. The sample programs are described in the subsections below.

4.3.4.2 Windows Graphics Mode

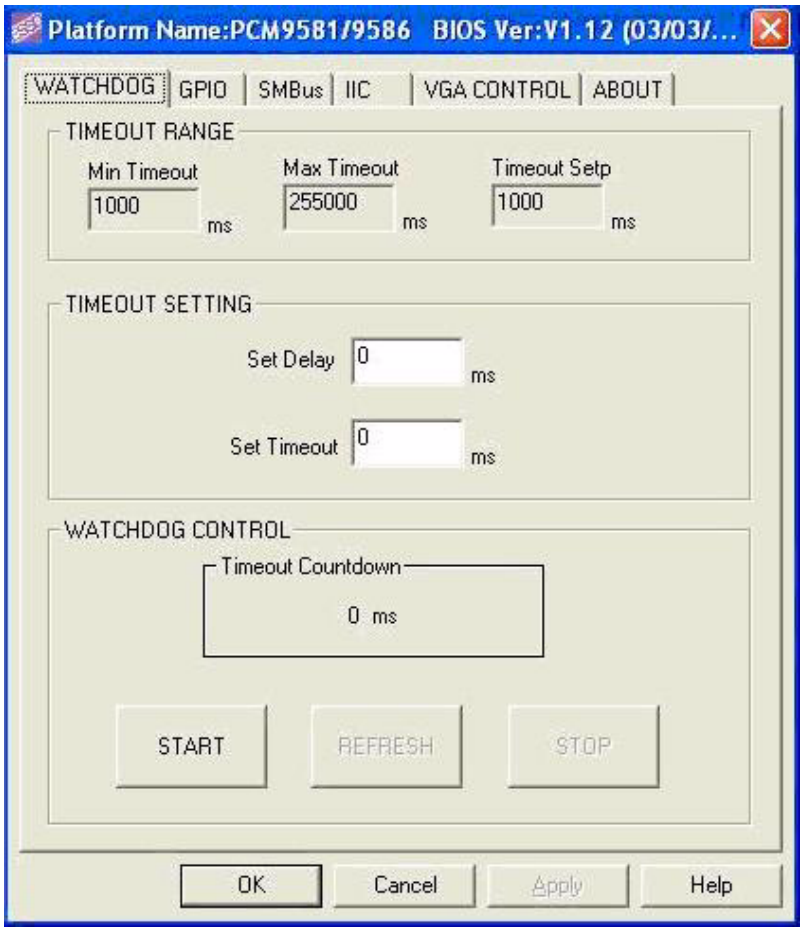
There are sample programs of Windows in graphics mode for two categories of operating system, i.e. Windows CE and Windows XP. Each demo application contains an executable file, “SusiDemo.exe”, a shared library, “Susi.dll”, and source code within the release package. The Windows CE and Windows XP files are not compatible with each other.

SusiDemo.exe is an executable file and it requires the shared library, Susi.dll, to demonstrate the SUSI functions. The source code of SusiDemo.exe also has two versions, i.e. Windows CE and Windows XP, and must be compiled under Microsoft Visual C++ 6.0 on Windows XP or under Microsoft Embedded Visual C++ 4.0 on

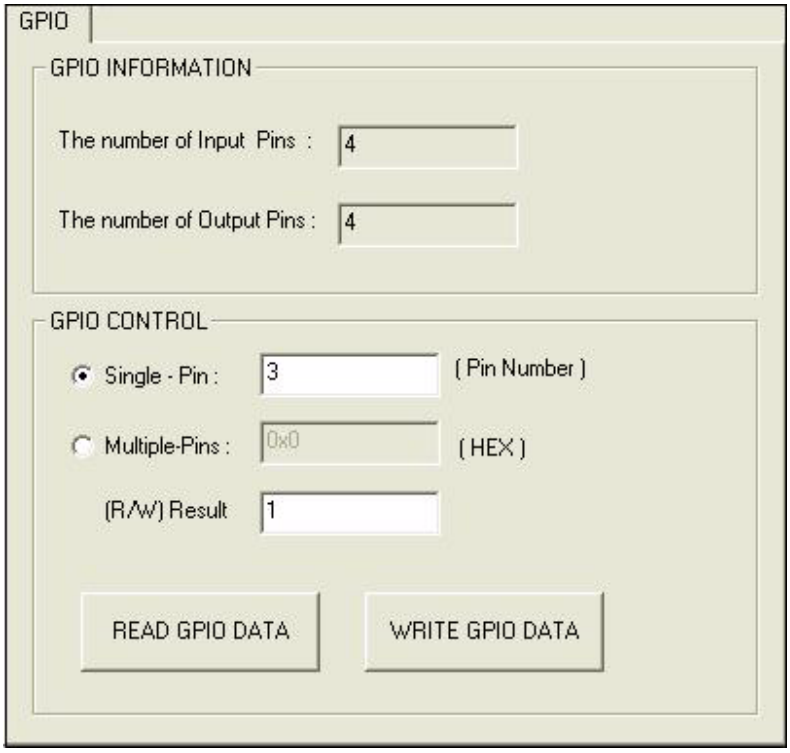
Windows CE. Developers must add the header file Susi.h and library Susi.lib to their own projects when they want to develop something with SUSI.

4.3.4.3 SusiDemo.exe

The SusiDemo.exe test application is an application which uses all functions of the SUSI Library. It has five major function blocks: Watchdog, GPIO, SMBus, I2C and VGA control. The following screen shot appears when you execute SusiDemo.exe. You can click function tabs to select test functions respectively. Some function tabs will not show on the test application if your platform does not support such functions. For a complete list of supported applications, please refer to Appendix A where the steps to test all functions of this application are described.



4.3.4.4 GPIO

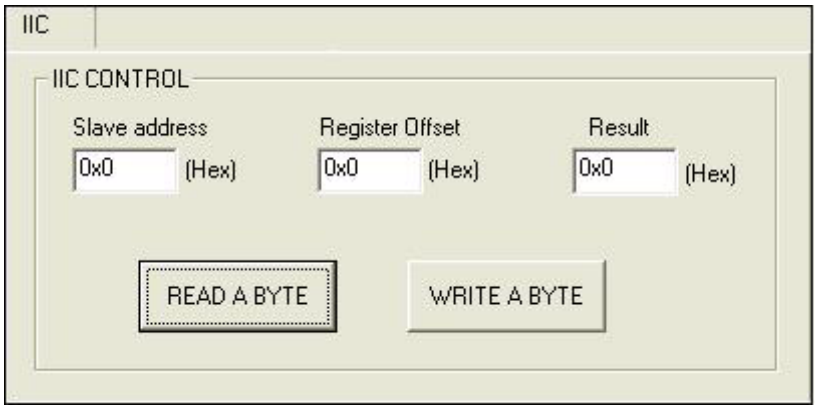


When the application is executed, it will display GPIO information in the GPIO INFORMATION group box. It displays the number of input pins and output pins. You can click the radio button to choose to test either the single pin function or multiple pin functions. The GPIO pin assignments of the supported platforms are located in Appendix B.

- Test Read Single Input Pin
  - Click the radio button- Single-Pin.
  - Key in the pin number to read the value of the input pin. The Pin number starts from '0'.
  - Click the READ GPIO DATA button and the status of the GPIO pin will be displayed in (R/W) Result field.
- Test Read Multiple Input Pin
  - Click the radio button- Multiple-Pins.
  - Key in the pin number from ‘0x01’ to ‘0x0F’ to read the value of the input pin. The pin numbers are ordered bitwise, i.e. bit 0 stands for GPIO 0, bit 1 stands for GPIO 1, etc. For example, if you want to read pin 0, 1, and 3, the pin numbers should be ‘0x0B’.
  - Click READ GPIO DATA button and the statuses of the GPIO pins will be displayed in (R/W) Result field.
- Test Write Single Output Pin
  - Click the radio button- Single-Pin.
  - Key in the pin numbers you want to write. Pin numbers start from '0'.
  - Key in the value either '0' or '1' in (R/W) Result field to write the output pin you chose above step.
  - Click the WRITE GPIO DATA button to write the GPIO output pin.
- Test Write Multiple Output Pins
  - Click the radio button- Multiple-Pins.

– Key in the pin number from ’0x01’ to ‘0x0F’ to choose the multiple pin numbers to write the value of the output pin. The pin numbers are ordered bitwise, i.e. bit 0 stands for GPIO 0, bit 1 stands for GPIO 1, etc. For example, if you want to write pin 0, 1, and 3, the pin numbers should be ‘0x0B’.
– Key in the value in (R/W) Result field from ‘0x01’ to ‘0x0F’ to write the value of the output pin. The pin numbers are ordered bitwise, i.e. bit 0 stands for GPIO 0, bit 1 stands for GPIO 1, etc. For example, if you want to set pin 0 and 1 high, 3 to low, the pin number should be ‘0x0B’, and then you should key in the value ‘0x0A’ to write.
– Click the WRITE GPIO DATA button to write the GPIO output pins.

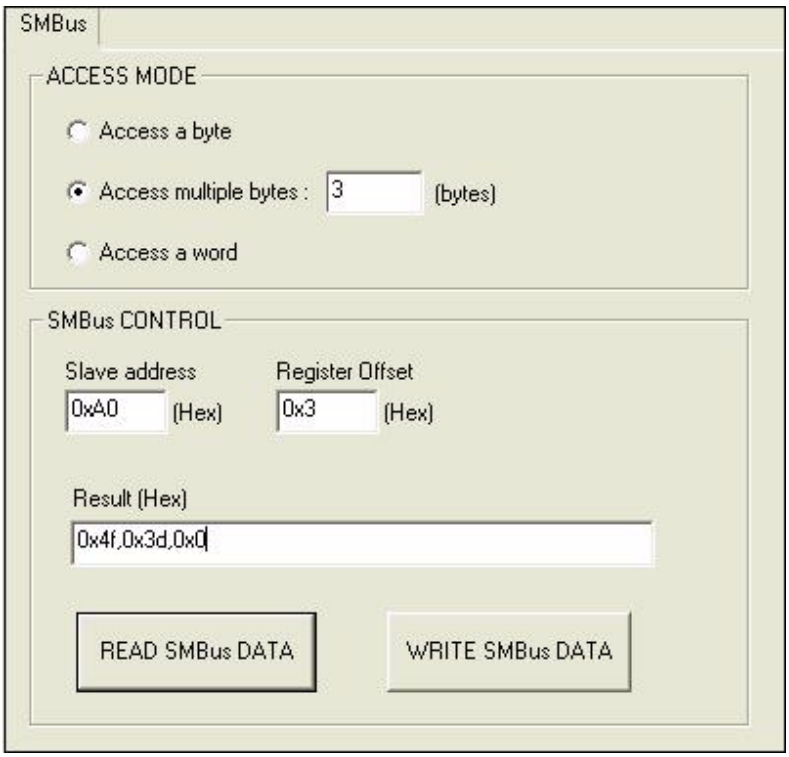
4.3.4.5 I²C



When the application is executed, you can read or write a byte of data through I²C devices. All data must be read or written in hexadecimal system.

- Read a byte
  – Key in the slave device address in Slave address field.
  – Key in the register offset in Register Offset field.
  – Click the READ A BYTE button and then a byte of data from the device will be shown on the Result field.
- Write a byte
  – Key in the slave device address in Slave address field.
  – Key in the register offset in Register Offset field.
  – Key in the desired data in the Result field to write to the device.
  – Click the “WRITE A BYTE” button and the data will be written to the device through I2C.

4.3.4.6 SMBus



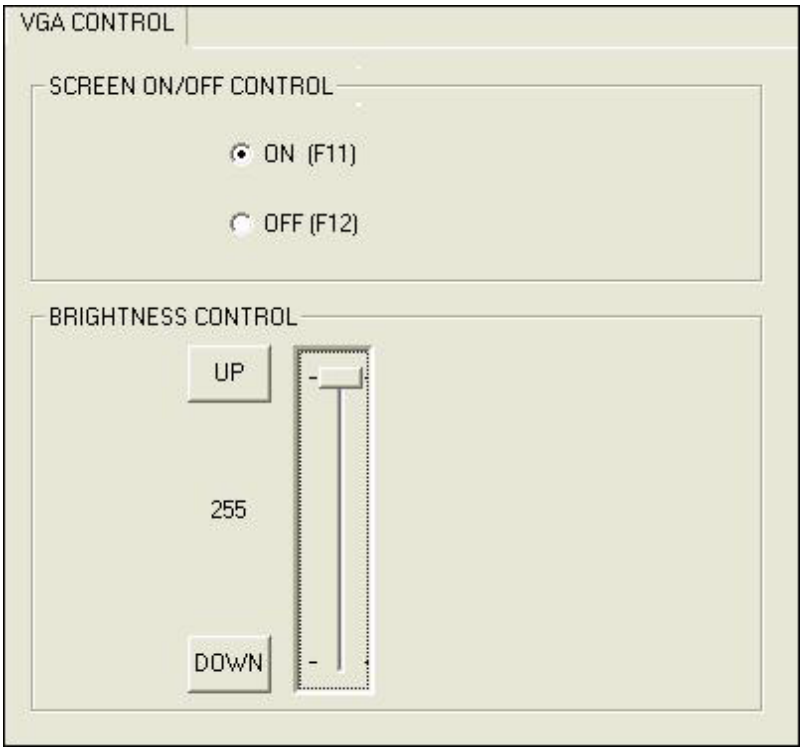
After the application has executed, you can click the radio button to choose to test each access mode, i.e. Access a byte, Access multiple bytes and Access a word. All data must be read or written in hexadecimal except the numbers for the radio button: Access multiple bytes mode must be written in decimal. You can test the functionalities of the watchdog as follows:

- Read a byte
  - Click the radio button- Access a byte.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Click the “READ SMBus DATA” button and a byte of data from the device will be shown on the Result field.
- Write a byte
  - Click the radio button- Access a byte.
  - Key in the slave device address in Slave address field.
  - Key in the register offset in Register Offset field.
  - Key the desired data in the Result field to write to the device.
  - Click the “WRITE SMBus DATA” button and then the data will be written to the device through SMBus.
- Read a word
  - Click the radio button- Access a word.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Click the “READ SMBus DATA” button and then a word of data from the device will be shown on the Result field.
- Write a word
  - Click the radio button- Access a word.
  - Key in the slave device address in the Slave address field.

- Key in the register offset in the Register Offset field.
- Key in the desired data, such as 0x1234, in the Result field to write to the device.
- Click the “WRITE SMBus DATA” button and the data will be written to the device through the SMBus.

- Read Multiple bytes
  - Click the radio button- Access multiple bytes.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Key in the desired number of bytes, such as 3, in the right side field of radio button- Access multiple bytes. The number must be written in decimal.
  - Click the “READ SMBus DATA” button and all data from the device will be separated by comma delimters and be shown in the Result field.
- Write Multiple bytes
  - Click the radio button- Access multiple bytes.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Key in the desired number of bytes, such as 3, in the right side field of the radio button- Access multiple bytes. The number must be written in decimal.
  - Key in all the desired data in the Result field in hexadecimal format, separated by commas, for example, 0x50, 0x60, 0x7A.
  - Click the “WRITE SMBus DATA” button and all of the data will be written to the device through the SMBus.

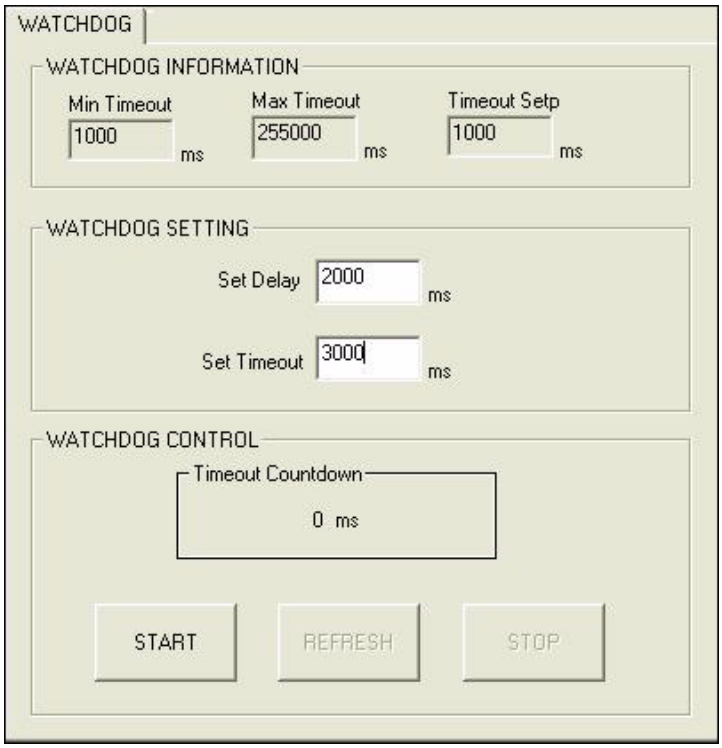
4.3.4.7 VGA Control



When the application is executed, it will display two blocks of VGA control functions. The application can turn on or turn off the screen shot freely, and it also can tune the brightness of the panels if your platform is supported. You can test the functionality of VGA control as follows:

- Screen on/off control
  - Click the radio button ON or push the key F11 to turn on the panel screen.
  - Click the radio button OFF or push the key F12 to turn off the panel screen.
  - The display chip of your platform must be in the support list in Appendix A, or this function cannot work.
- Brightness control
  - Move the slider up, using either the mouse or the direction keys, or click the UP button to increase the brightness.
  - Move the slider down, using either the mouse or the direction keys, or click the DOWN button to decrease the brightness.

4.3.4.8 Watchdog



When the application is executed, it will display watchdog information in the WATCHDOG INFORMATION group box. It displays max timeout, min timeout, and timeout steps in milliseconds. For example, a 1 ~ 255 second watchdog will have 255000 max timeout, 1000 min timeout, and 1000 timeout steps. You can test the functionality of the watchdog as follows:

- Set the timeout value 3000 (3 sec.) in the SET TIMEOUT field and set the delay value 2000 (2 sec.) in the SET DELAY field, then click the START button. The Timeout Countdown field will countdown the watchdog timer and display 5000 (5 sec.).
- Before the timer counts down to zero, it can be reset by clicking the REFRESH button. After clicking this button, the Timeout Countdown field will display the value of the SET TIMEOUT field.
- If you want to stop the watchdog timer, just click the STOP button.

4.3.4.9 Hardware Monitor

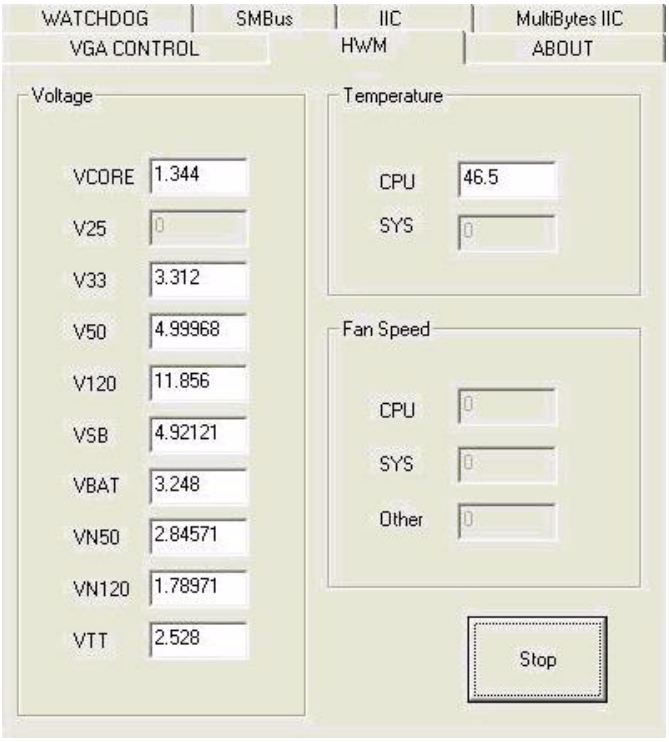


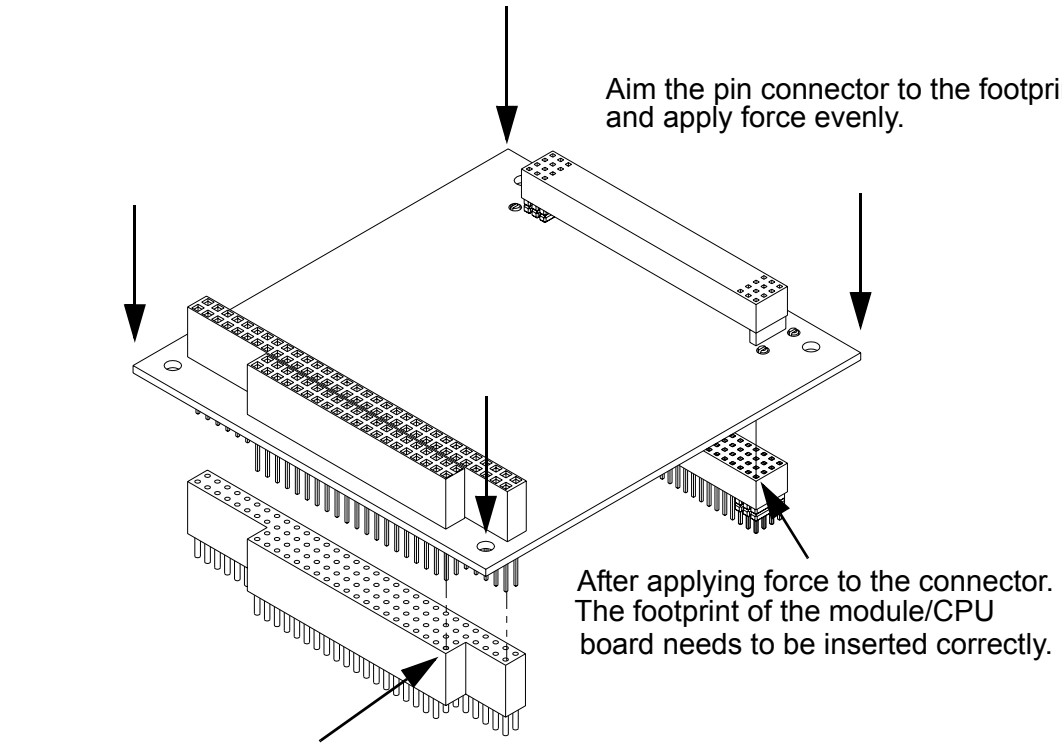
Figure 4.1 CL

When the Monitor application is executed by clicking the button, hardware monitoring data values will be displayed. If certain data values are not supported by the platform, the correspondent data field will be grayed-out with a value of 0.

Chapter 5

Extension I/O Installation

5.4 PC/104

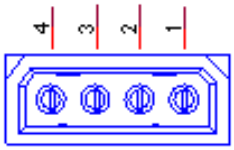

Aim the pin connector to the footprint and apply force evenly.
After applying force to the connector. The footprint of the module/CPU board needs to be inserted correctly.
After applying force to the connector. The footprint of the module/CPU board need to be inserted correctly.

Appendix A

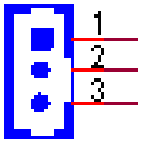
Pin Assignments

A.1 Pin Assignments

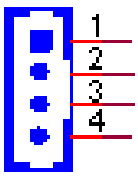
CN1	AT POWER Connector
Description	**HOUSING 5.08 mm 4P 180D**
Pin	**Pin name**
1	+12 V
2	GND
3	GND
4	+5 V



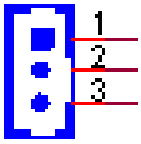
CN2	ATX POWER Standby Connector
Description	**WAFER BOX 2.0 mm 3P 180D**
Pin	**Pin name**
1	+5 VSB
2	GND
3	PSON#



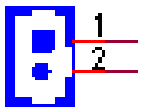
CN3	SMBUS
Description	**WAFER BOX 2.0 mm 4P 180D (M) W/LOCK A2001WV2-4P**
Pin	**Pin name**
1	GND
2	SMBDAT
3	SMBCLK
4	+5 V



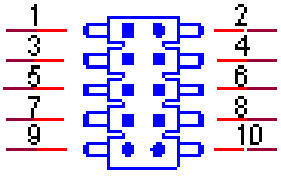
CN4	FAN Connector (SPEED Detect)
Description	**WAFER BOX 2.0 mm 3P 180D**
Pin	**Pin name**
1	SPEED DETECT
2	+5 V
3	GND



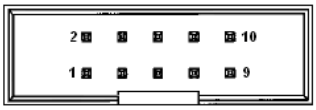
CN5	ATX Power Button Connector
Description	**WAFER BOX 2P 180D (M) 2.0 mm W/Lock**
Pin	**Pin Name**
1	+5 VSB
2	PSIN



CN6	GPIO
Description	**PIN HEADER SMD 5*2P 180D (M) 2.0 mm**
Pin	**Pin Name**
1	+5 V
2	GPIO4
3	GPIO0
4	GPIO5
5	GPIO1
6	GPIO6
7	GPIO2
8	GPIO7
9	GPIO3
10	GND

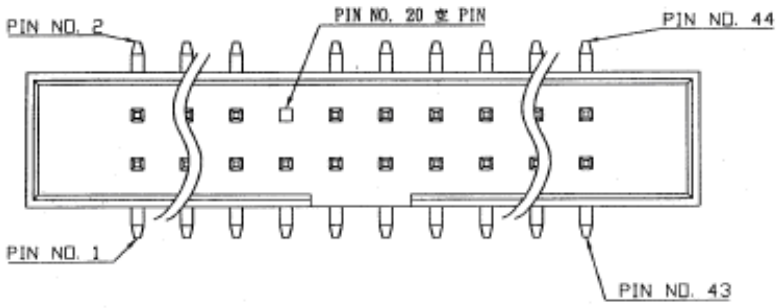


CN7	AUDIO Connector
Description	**BOX HEADER SMD 5*2 180D (M) 2.0 mm**
Pin	**Pin Name**
1	LOUT_R
2	LIN_R
3	GND
4	GND
5	LOUT_L
6	LIN_L
7	GND
8	GND
9	MIC1R
10	MIC1L



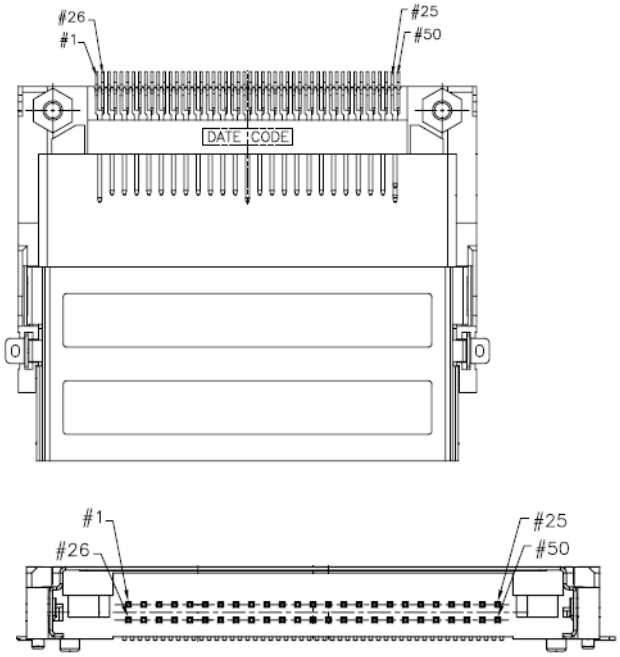
CN8	IDE Connector
Description	**BOX HEADER SMD 22*2P 180D (M) 2.0 mm IDIOT-PROOF**
Pin	**Pin Name**
1	RST#
2	GND
3	DD7
4	DD8
5	DD6
6	DD9
7	DD5
8	DD10
9	DD4
10	DD11
11	DD3
12	DD12
13	DD2
14	DD13
15	DD1
16	DD14
17	DD0
18	DD15
19	GND
20	KEYIN
21	DMARQ
22	GND
23	DIOW#
24	GND
25	DIOR#
26	GND
27	IORDY
28	CSEL
29	DMACK#
30	GND
31	INTRQ
32	NC
33	A1
34	PDIAG#
35	A0
36	A2
37	CS0#
38	CS1#
39	DASP#
40	GND
41	+5V
42	+5V
43	GND

44	NC

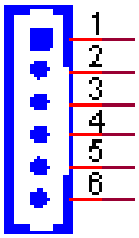


CN9	Compact Flash
Description	CF HEADER 50P 90D(M) 1.27 MM SMD N016@0140-004
Pin	Pin Name
1	GND
2	D03
3	D04
4	D05
5	D06
6	D07
7	CS0#
8	A10
9	GND
10	GND
11	GND
12	GND
13	+5V
14	GND
15	GND
16	GND
17	GND
18	A02
19	A01
20	A00
21	D00
22	D01
23	D02
24	NC
25	CD2#
26	CD1#
27	D11
28	D12
29	D13
30	D14
31	D15
32	CS1#
33	VS1#

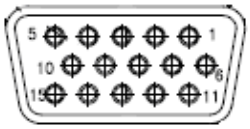
34	IORD#
35	IOWR#
36	WE#
37	IREQ
38	+5V
39	CSEL#
40	VS2#
41	RESET
42	IORDY
43	INPACK#
44	REG#
45	DSAP#
46	POIAG#
47	D08
48	D09
49	D10
50	GND



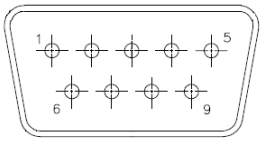
CN10	HDD & PWR LED
Description	**WAFER BOX 2.0 mm 6P 180D**
Pin	**Pin name**
1	+5 V
2	GND
3	Power LED+
4	Power LED-
5	HDD LED+
6	HDD LED-



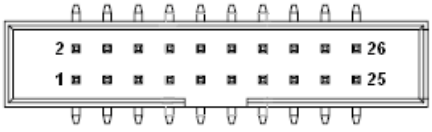
CN11	VGA
Description	**D-SUB Conn. 15P 90D (F) DIP 070242FR015S200ZU**
Pin	**Pin Name**
1	RED
2	GREEN
3	BLUE
4	NC
5	GND
6	GND
7	GND
8	GND
9	NC
10	GND
11	NC
12	DDAT
13	HSYNC
14	VSYNC
15	DCLK



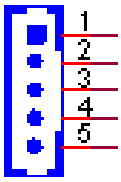
CN12	COM1
Description	**D-SUB CON. 9P 90D (M)DIP 070241MR009S200ZU SUYIN**
Pin	**Pin Name**
1	DCD#
2	RXD
3	TXD
4	DTR#
5	GND
6	DSR#
7	RTS#
8	CTS#
9	RI#



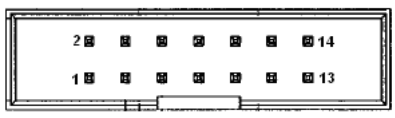
CN13	LPT Connector		
Description	**BOX HEADER SMD 13*2P 2.0 mm**		
Pin	**Pin name**	**Pin**	**Pin name**
1	STROBE#	2	AUTOFEED#
3	D0	4	ERROR#
5	D1	6	INIT#
7	D2	8	SLCTIN#
9	D3	10	GND
11	D4	12	GND
13	D5	14	GND
15	D6	16	GND
17	D7	18	GND
19	ACK#	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	NC



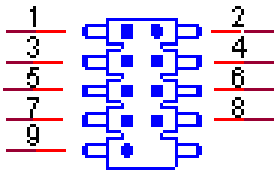
CN14	IR Connector
Description	**WAFER BOX 2.0 mm 5P 180D**
Pin	**Pin name**
1	+5 V
2	Reserved
3	IRRX
4	GND
5	IRTX



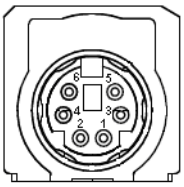
CN15	COM2 RS-232/RS-422/RS-485 Connector
Description	**BOX HEADER SMD 7*2P 180D (M) 2.0 mm**
Pin	**Pin Name**
1	DCD#
2	DSR
3	RXD
4	RTS#
5	TXD
6	CTS#
7	DTR#
8	RI#
9	GND
10	GND
11	485/422TX+
12	485/422TX-
13	422RX+
14	422RX-



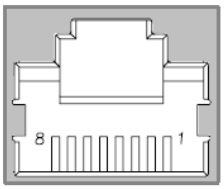
CN16	USB Connector
Description	**PIN HEADER 5*2P 180D (M) 2.0 mm SMD IDIOT-PROOF**
Pin	**Pin name**
1	+5 V
2	+5 V
3	A_D-
4	B_D-
5	A_D+
6	B_D-
7	GND
8	GND
9	GND



CN17	PS2
Description	**MINIDIN 6P 90D (F) D Short body W/Shielding WO/Pb**
Pin	**Pin Name**
1	KBDAT
2	MSDAT
3	GND
4	+5 V
5	KBCLK
6	MSCLK



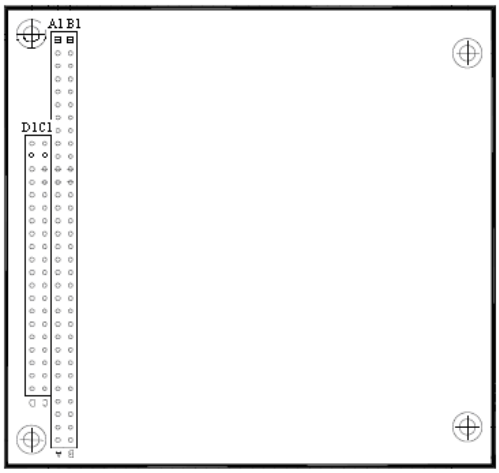
CN19	LAN Connector
Description	**PHONE JACK RJ45 8P 90D (F) DIP 677-088-D06**
Pin	**Pin name**
1	TX+
2	TX-
3	RX+
4	NC
5	NC
6	RX-
7	NC
8	NC



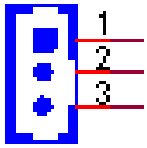
CN20	PC104
Description	
Pin	**Pin Name**
A1	IOCHCK
A2	SD7
A3	SD6
A4	SD5
A5	SD4
A6	SD3
A7	SD2
A8	SD1
A9	SD0
A10	IOCHRDY
A11	AEN
A12	SA19
A13	SA18
A14	SA17
A15	SA16
A16	SA15
A17	SA14
A18	SA13
A19	SA12
A20	SA11
A21	SA10
A22	SA9
A23	SA8
A24	SA7

A25	SA6
A26	SA5
A27	SA4
A28	SA3
A29	SA2
A30	SA1
A31	SA0
A32	GND
B1	GND
B2	RSTDRV
B3	+5 V
B4	IRQ9
B5	-5 V
B6	DRQ2
B7	-12 V
B8	0WS#
B9	+12 V
B10	GND
B11	SMEMW#
B12	SMEMR#
B13	IOW#
B14	IOR#
B15	DACK3#
B16	DRQ3
B17	DACK1#
B18	DRQ1
B19	REFRESH#
B20	SYSCLK
B21	IRQ7
B22	IRQ6
B23	IRQ5
B24	IRQ4
B25	IRQ3
B26	DACK2#
B27	TC
B28	ALE#
B29	+5V
B30	OSC
B31	GND
B32	GND
C1	GND
C2	BHE#
C3	LA23
C4	LA22
C5	LA21
C6	LA20
C7	LA19
C8	LA18

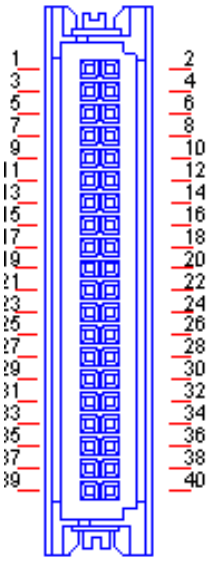
C9	LA17
C10	MEMR#
C11	MEMW#
C12	SD8
C13	SD9
C14	SD10
C15	SD11
C16	SD12
C17	SD13
C18	SD14
C19	SD15
C20	NC
D1	GND
D2	MEMCS16#
D3	IOCS16#
D4	IRQ10
D5	IRQ11
D6	IRQ12
D7	IRQ15
D8	IRQ14
D9	DACK0#
D10	DRQ0
D11	DACK5#
D12	DRQ5
D13	DACK6#
D14	DRQ6
D15	DACK7#
D16	DRQ7
D17	+5 V
D18	MASTER#
D19	GND
D20	GND



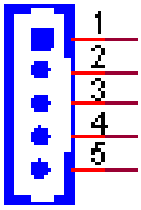
CN21	Negative POWER Input
Description	**WAFER BOX 2.0 mm 3P 180D w/LOCK**
Pin	**Pin name**
1	-5 V
2	GND
3	-12 V



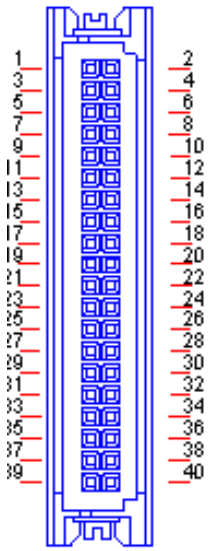
CN22	LVDS LCD 40-Pin HIROSE		
Description	**DF13-40DP-1.25 V**		
Pin	**Pin name**	**Pin**	**Pin name**
1	+5 V or +3. 3V	2	+5 V or +3.3 V
3	GND	4	GND
5	+5 V or +3.3 V	6	+5 V or +3.3 V
7	LVDS0_D0-	8	LVDS1_D0-
9	LVDS0_D0+	10	LVDS1_D0+
11	GND	12	GND
13	LVDS0_D1-	14	LVDS1_D1-
15	LVDS0_D1+	16	LVDS1_D1+
17	GND	18	GND
19	LVDS0_D2-	20	LVDS1_D2-
21	LVDS0_D2+	22	LVDS1_D2+
23	GND	24	GND
25	LVDS0_CLK-	26	LVDS1_CLK-
27	LVDS0_CLK+	28	LVDS1_CLK+
29	GND	30	GND
31	DDC_CLK	32	DDC_DATA
33	GND	34	GND
35	LVDS0_D3-	36	LVDS1_D3-
37	LVDS0_D3+	38	LVDS1_D3+
39	NC	40	NC



CN23	**Invert Power Connector**
Description	**WAFER BOX 2.0 mm 5P 180D**
Pin	**Pin name**
1	+12 V
2	GND
3	ENABKL
4	VBR
5	+5 V



CN24	TTL LCD 40-Pin HIROSE		
Description	**DF13-40DP-1.25 V**		
Pin	**Pin name**	**Pin**	**Pin name**
1	+5 V	2	+5 V
3	GND	4	GND
5	+3.3 V	6	+3.3 V
7	NC	8	GND
9	NC	10	NC
11	PD2 (B0)	12	PD3 (B1)
13	PD4 (B2)	14	PD5 (B3)
15	PD6 (B4)	16	PD7 (B5)
17	NC	18	NC
19	PD10 (G0)	20	PD11 (G1)
21	PD12 (G2)	22	PD13 (G3)
23	PD14 (G4)	24	PD15 (G5)
25	NC	26	NC
27	PD18 (R0)	28	PD19 (R1)
29	PD20 (R2)	30	PD21 (R3)
31	PD22 (R4)	32	PD23 (R5)
33	GND	34	GND
35	SHFCLK	36	FLM (V-SYNC)
37	M/ (DE)	38	LP (H-SYNC)
39	NC	40	ENVEE



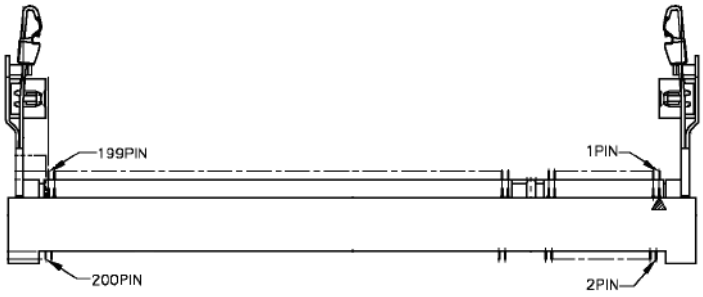
DIMM1	DDR-SODIMM
Description	***SODIMM200P DDR RVS. 0.6 mm H=5.2 90D 0-1473006-1**
Pin	**Pin Name**
1	VREF
2	VREF
3	GND
4	GND
5	DQ5
6	DQ0
7	DQ4
8	DQ1
9	+2.5 V
10	+2.5 V
11	DQS0
12	DM0
13	DQ2
14	DQ7
15	GND
16	GND
17	DQ6
18	DQ3
19	DQ9
20	DQ8
21	+2.5 V
22	+2.5 V
23	DQ12
24	DQ13
25	DQS1
26	DM1
27	GND
28	GND
29	DQ11
30	DQ14
31	DQ10
32	DQ15
33	+2.5 V
34	+2.5 V
35	CK0
36	+2.5 V
37	CK0#
38	GND
39	GND
40	GND
41	DQ17
42	DQ21
43	DQ16

44	DQ20
45	+2.5 V
46	+2.5 V
47	DQS2
48	DM2
49	DQ18
50	DQ23
51	GND
52	GND
53	DQ19
54	DQ22
55	DQ25
56	DQ28
57	+2.5 V
58	+2.5 V
59	DQ29
60	DQ24
61	DQS3
62	DM3
63	GND
64	GND
65	DQ26
66	DQ30
67	DQ31
68	DQ27
69	+2.5 V
70	+2.5 V
71	NC
72	NC
73	NC
74	NC
75	GND
76	GND
77	NC
78	NC
79	NC
80	NC
81	+2. 5V
82	+2.5 V
83	NC
84	NC
85	NC
86	NC
87	GND
88	GND
89	NC
90	GND
91	NC

92	+2.5 V
93	+2.5 V
94	+2.5 V
95	CKE1
96	CKE0
97	NC
98	NC
99	A12
100	A11
101	A9
102	A8
103	GND
104	GND
105	A7
106	A6
107	A5
108	A4
109	A3
110	A2
111	A1
112	A0
113	+2.5 V
114	+2.5 V
115	A10
116	BA1
117	BA0
118	RAS#
119	WE#
120	CAS#
121	S0#
122	S1#
123	NC
124	NC
125	GND
126	GND
127	DQ32
128	DQ36
129	DQ33
130	DQ37
131	+2.5 V
132	+2.5 V
133	DQS4
134	DM4
135	DQ38
136	DQ39
137	GND
138	GND
139	DQ34

140	DQ35
141	DQ40
142	DQ45
143	+2.5 V
144	+2.5 V
145	DQ44
146	DQ41
147	DQS5
148	DM5
149	GND
150	GND
151	DQ43
152	DQ46
153	DQ42
154	DQ47
155	+2.5 V
156	+2.5 V
157	+2.5 V
158	CK1#
159	GND
160	CK1
161	GND
162	GND
163	DQ50
164	DQ52
165	DQ54
166	DQ49
167	+2.5 V
168	+2.5 V
169	DQS6
170	DM6
171	DQ48
172	DQ53
173	GND
174	GND
175	DQ51
176	DQ55
177	DQ56
178	DQ60
179	+2.5 V
180	+2.5 V
181	DQ57
182	DQ61
183	DQS7
184	DM7
185	GND
186	GND
187	DQ63

188	DQ58
189	DQ59
190	DQ62
191	+2.5 V
192	+2.5 V
193	SDA
194	GND
195	SCL
196	GND
197	+2.5 V
198	GND
199	NC
200	NC



Appendix B

Watchdog Timer

B.1 Watchdog Timer Sample Code

```
NEWIODELAY      MACRO
                out     0ebh,al
                ENDM
        .MODEL small,c
        .486p
        .dosseg
        .stack
        .const
Superio_Config_Port     equ


2eh
        .data
        .code
        .startup
                call


Superio_Enter_Config    ;unlock


superio
                mov     al,10


              ;set 10 seconds
                call    Set_WDT


              ;Watch_Dog_Setting
                call


Superio_Exit_Config     ;lock


superio
        .exit

;[]


================================
```

```
;============================[]
;Input  : AL - WDT timer
;[]


;==================================


;============================[]
      public  Set_WDT
Set_WDT       proc    near
              pusha
              push    ax
              mov     cl,8


            ;set to device 8
              call


Set_Logic_Device

              mov     cl,0f5h


            ;get and set WDT


counter mode to second
              call


Superio_Get_Reg
              and     al, not


08h
              call


Superio_Set_Reg

              mov     cl,0f6h
```

```
            ;set WDT Timer
              pop     ax
              call


Superio_Set_Reg

              mov     cl,0f7h


            ;Disable Watchdog


timer resets by the mouse or


keyboard interrupts
              xor     al,al
              call


Superio_Set_Reg

              mov     cl,30h


            ;set device active
              mov     al,1
              call


Superio_Set_Reg
              popa
              ret
Set_WDT         Endp

;[]


================================


============================[]
;Input  : CL - logic device to set
```

```
;[]

================================


==============================[]
      public  Set_Logic_Device
Set_Logic_Device       proc


near
            push    ax
            push    cx
            xchg    al,cl
            mov     cl,07h
            call


Superio_Set_Reg
            pop     cx
            pop     ax
            ret
Set_Logic_Device       Endp

;[]


================================


==============================[]
;Input  : CL - register index
;Output : AL - Value read
;[]


================================


==============================[]
      public  Superio_Get_Reg
Superio_Get_Reg proc    Near
            mov     al, cl
            mov     dx,
```

```
Superio_Config_Port
            out     dx, al
            NEWIODELAY
            inc     dx
            in      al, dx
            NEWIODELAY

            ret
Superio_Get_Reg endp

;[]


==================================


============================[]
;Input : CL - register index
;       AL - Value to write
;[]


==================================


============================[]
      public  Superio_Set_Reg
Superio_Set_Reg proc    near
            push    ax
            mov     dx,


Superio_Config_Port
            mov     al,cl
            out     dx,al
            NEWIODELAY
            pop     ax
            inc     dx
            out     dx,al
            NEWIODELAY
            ret
Superio_Set_Reg endp
```

```
        public


Superio_Enter_Config
Superio_Enter_Config    Proc


Near
                mov     dx,


Superio_Config_Port
                mov     al, 087h
                out     dx, al
                out     dx, al
                ret
Superio_Enter_Config    Endp

        public


Superio_Exit_Config
Superio_Exit_Config     Proc


Near
                mov     dx,


Superio_Config_Port
                mov     al, 0AAh
                out     dx, al
                ret
Superio_Exit_Config     Endp

        END
```

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